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THE SYSTEMATICS AND MORPHOLOGY OF THE NEARCTIC SPECIES OF *DIAMESA* MEIGEN, 1835 (DIPTERA: CHIRONOMIDAE)[1]

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INTRODUCTION

Adults of the genus *Diamesa* Meigen are medium sized, brown or dark gray chironomids. The larvae live in cold, well-oxygenated water of streams (Figs. 30-33), springs, glacial or snowfield meltwater streams, or, more rarely, in the shallows of arctic ponds (Thienemann, 1937b; Styczynski and Rakusa-Suszczewski, 1963). The genus is most abundant at higher elevations and latitudes — species occur far above timberline in the mountains, and one species has been found nearly as far north as land extends: Ward Hunt Island off the northern coast of Ellesmere Island. In the United States, the adults of several species emerge in the winter months and may, during a winter thaw, be rather common on the snow along streams — hence their common name of "winter midges." The

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males of many of the species have the plumose antennae and slender legs typical of the family and are active fliers (Fig. 149). In some species, however, the male antennae are non-plumose and shortened, the legs are longer, and the adults run about on rocks in streams and are much less inclined to fly. At least two such species have brachypterous forms.

While the European fauna has been quite well worked out (Pagast, 1947; Serra-Tosio, 1964; 1966; 1967a, b, c; 1968; 1969a, b; 1970a, b, c; 1971; Wuelker, 1959), the nearctic species have been very poorly known. No keys to the identification of adults have been published, and accurate determination of species has been difficult with the scattered and often inadequate descriptions. This revision treats the adult male stage of those species occurring in the Nearctic Region north of Mexico. A study of adult morphology, to serve as a foundation for the descriptions, is also presented. In all, 30 species are recognized as valid and are described. Nine of these are new, and one is a new nearctic record of a European species. Six species are regarded as new synonyms, and one name is a *nomen dubium.*

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Scope of Study

At the start of this study, I had hoped to revise the entire subfamily Diamesinae, treating larvae, pupae, and adults, but this proved to be impractical. Furthermore, as work progressed, the need for a study of adult morphology became evident. Many chironomid descriptions, I found, were too superficial, and terminology used in descriptions was morphologically incorrect. I therefore decided to study the morphology of the adult male and attempt to correlate systematic terminology with morphological interpretations. This would then serve as a foundation for my descriptions of *Diamesa,* beside being applicable to other studies in the Chironomidae and other Diptera. This revision seeks to put the systematics of the adult males of nearctic *Diamesa* on a firm basis. No discussion of sister groups, higher classification, phylogeny, etc. is attempted; this will have to wait for a further study of the immatures of *Diamesa* and a revision of the other Diamesinae.

Historical Review

Meigen originally intended to use the name *Diamesa* for a genus of Cecidomyiidae, and a figure of a fly with this name appeared in his 1830 work (Tab. 65, Fig. 16 & 17). In a footnote in the text, however, Meigen (1830: 308) states that this genus had been described as *Lestremia* by Macquart and that the name *Diamesa* in the figure should be changed to *Lestremia,* as he did in the text of his work. This use of the name *Diamesa* in a figure is the reason for the citation of "Diamesa Meigen 1830" in Neave (1939).

The next use of the name was in Waltl (1835). The title of the paper (translated), "New species of Diptera from the region of Munich," is followed by a subtitle, "named and described by Meigen, discovered by Dr. J. Waltl." The paper is a series of descriptions, number 3 of which is "*Diamesa.* (Novum Genus.)*," followed by a description. The asterisk after "(Novum Genus)" refers to the footnote (translated), "The species '*cinerella*' is at the same time codescribed." The same paper was repeated, with only minor changes, in Waltl (1837). This latter paper had no subtitle giving Meigen authorship of the species, although a phrase in parentheses after the author's name states "Aus dem Faunus von Gistl.," the journal in which Waltl (1835) appeared. Species number 3 in the series was given as "*Diamesa cinerella* (neue Gattung)," followed by essentially the same description as in Waltl (1835).

In his 1838 work Meigen included two species in *Diamesa,*[2] namely, *Waltlii* and *Gaedii.* No mention was made of *cinerella* or of Waltl's two papers, although Meigen does, in his "Vorrede," acknowledge the "numerous contributions" of specimens from Dr. Waltl. The description of *Waltlii* is, however, quite like that of *cinerella,* and Meigen states that his material of *Waltlii* consisted of "three quite the same specimens from Bavaria, from Dr. Waltl." It seems evident that Meigen simply renamed *cinerella* as *Waltlii,* as was later stated by Bergroth (1887). This renaming has led to some confusion, and three questions must be answered: is Meigen or Waltl the author of *Diamesa,* what is the date of the genus, and what is the type species? Sublette and Sublette (1965) and Serra-Tosio (1971) attribute *Diamesa* to Waltl (1837), while others have regarded Meigen as the author, sometimes with no date, but usually with 1838. As stated in Waltl (1835), the species listed were "named and described by Meigen," so *Diamesa* Meigen *in* Waltl, 1835, or simply *Diamesa* Meigen, 1835, would be the correct name, author, and date of the genus. Also, because *cinerella* was the sole species of *Diamesa* mentioned in Waltl (1835), albeit in a footnote, *cinerella* is the type of the genus by monotypy (Art. 68(c), International Code of Zoological Nomenclature). Coquillett's (1910) designation of *D. Waltlii* Meigen 1838 as the type species must therefore be disregarded.

The descriptions and figures of *D. cinerella, Waltlii,* and *Gaedii* are too brief and unclear to positively identify Meigen's specimens even to genus, and it is possible that we have misinterpreted *Diamesa.* The types of *D.*

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[2] δια (inter), μεσος (medius) (Agassiz, 1842-1846). I presume Meigen meant to indicate that *Diamesa* was "intermediate" between his genera *Chironomus* and *Tanypus.*

Waltlii were reviewed by Goetghebuer (1923), and, according to him, *Tanypus praecox* Meigen, 1830, is a *Diamesa* and is the male of *D. Waltlii*. He therefore synonymized *D. Waltlii* with *praecox*. Goetghebuer (1923), however, states that the fourth tarsal segment in *Waltlii* is cylindrical, so *Waltlii* can not be a *Diamesa* as we presently understand the genus. Possibly Goetghebuer was mistaken. In any case, Staeger (1845) included a fair description of "*D. Waltlii*" (actually *D. aberrata* Lundbeck), including venational characters, and Walker (1856) included descriptions and one figure of several species presently assigned to *Diamesa* or closely related genera. The genus has been fairly well defined from the time of these workers, and, in the absence of an examination of the type of *Waltlii*, I shall use *Diamesa* in its presently accepted usage, i.e., that of Pagast (1947) or Serra-Tosio (1971). It must be noted, however, that the types of *D.* "*Waltlii*" in the Meigen collection in the Museum of Natural History in Paris are possibly females of some other Diamesinae, and that these types must eventually be reexamined and their identity established to put the use of *Diamesa* on a firm and nomenclatorially correct basis.

The first species of *Diamesa* recorded from the Nearctic was "*D. Waltlii* M." from Greenland (Staeger, 1845). At least one, and probably all, of Staeger's specimens were, however, *D. aberrata* Lundbeck. Shortly thereafter, Fitch (1847) described *Chironomus nivoriundus* from New York State. The description was unclear, and *nivoriundus* has been regarded as either an *Orthocladius* (Johannsen, 1905) or a *Diamesa* (Johannsen, 1903, 1934). Around the turn of the century Lundbeck (1898) in Sweden described *D. aberrata* and *chorea* from specimens from Greenland, and Coquillett (1899, 1905) in the U.S. described two *Diamesa* as *Eutanypus borealis* from Alaska and *Tanypus heteropus* from Colorado. A decade later Muttkowski (1915) described *D. mendotae* from Wisconsin, and Malloch (1915) recorded "*D. waltlii* M." (probably *D. chiobates* n. sp.) from Illinois. Garrett (1925) described several Diamesinae from British Columbia, including *D. banana* and *borealis*. The following year Kieffer (1926) in France described *D. geminata* and *simplex* from material at Oslo collected on Ellesmere Island, and, two years later, Goetghebuer (*in* Remy, 1928a) in Belgium described *D. biappendiculata* from Scorseby-Sund, Greenland. In the 1930's Edwards at the BM(NH) described or recorded several *Diamesa* from the Nearctic. He described *D. davisi, clavata, furcata,* and *gregsoni* and recorded *D. bohemani* Goetghebuer from material brought back to Oxford University from Hudson's Strait (Edwards, 1933), and he described *D. bertrami* and recorded *D. lindrothi* and *?ursus* Kieffer from east Greenland (Edwards, 1935).

Little was done with Nearctic *Diamesa* from then until the late 1950's (Pagast did not treat them in his revision of 1947), when Roback (1957a, 1959) described *D. leona, pieta, caena, onteona,* and *ancysta* and recorded *D. incallida* (Walker) from the western United States. Oliver (1963) recorded *D. arctica* (Boheman) from Ellesmere Island. Sublette and Sublette (1965) summarized the known distribution records and synonymies of the genus, listing 18 species recognized as valid and assigned to *Diamesa* in this study. In the late 1960's Sublette (1966, 1967a, 1967b) published a valuable series of papers redescribing North American chironomid types. This series included several *Diamesa* and made determination of at least these species possible. Finally, Saether (1969) described *D. spinacies* and *fonticola* from Alberta and Manitoba, respectively.

Several other papers included references to described Nearctic *Diamesa,* either as new distribution records, redescriptions, descriptions of immature stages, keys to larvae, etc. These references need not be reviewed chronologically here; they are cited in their respective specific synonymies.

Methodology

Material examined. — Loans: As mentioned, several hundred specimens for this study were obtained on loan from the USNM, CNC, and ANSP, while smaller collections were borrowed from other U.S. institutions (see Acknowledgments). Early in this study it became evident, however, that most museums had few if any *Diamesa* sorted out from undetermined material. I was fortunate, therefore, to be able to personally examine the unsorted material at several university collections and to borrow any Diamesinae from these. Collections examined were: University of Wyoming (Laramie), University of Colorado (Boulder), Colorado State University (Fort Collins), Utah State University (Logan), University of Idaho (Moscow), Washington State University (Pullman), Western Washington State University (Bellingham), and the University of Michigan (Ann Arbor). J. E. Sublette had the entire chironomid collections of several universities, and he kindly let me examine these for Diamesinae. Included here were the chironomid collections from the University of Missouri, University of Kansas, Kansas State University, University of California (Riverside), University of California (Davis), Iowa State University, and the California Department of Public Health.

Collecting. — A fellow student, R. A. Hellenthal, added measurably to my material through his own collecting in the western U.S. in 1968, particularly in California and Montana. Also, E. F. Cook had light traps run at some 12 localities in Minnesota during the warmer months of 1968-1972, and a few of these traps did yield *Diamesa.*

A good part of the material for this study was collected by the author on various short collecting trips in Minnesota and Wisconsin and on a few longer trips to several western states. In August and September, 1967, my wife and I collected in South Dakota, in the Big Horn Mountains in Wyoming, on Mt. Baker in Washington, and in Idaho, Utah, and Colorado. In August, 1968, we again collected in the Big Horns, and in August, 1969, we collected there and in the Bear Tooth Mountains in Wyoming. I also collected briefly in Wyoming and Colorado (March, 1968), New Mexico and Colorado (December, 1968), and Missouri (April, 1969).

Collecting *Diamesa* can be both interesting and challenging, as they often occur only in such inaccessible places as snowfield meltwater streams on mountains or are about during mid-winter — hence their relative scarcity in most collections. Light traps are sometimes quite successful, particularly on warm nights in the spring and fall. They are, however, useless in the winter because the air temperature falls well below freezing by nightfall on days during which the adults emerge and are active. I have taken ten species at lights and presume all *Diamesa* are attracted to lights.

A sweep net can be very successful in collecting adults. I had some excellent collecting near timber line in the Big Horn Mountains by simply sweeping close to the branches of the spruce and fir of the forest or in the small openings between the trees. Actually sweeping or beating the branches of the conifers was sometimes necessary to capture *Diamesa* resting on them. Sweeping vegetation along streams and springs is another sometimes successful collecting technique, as is sweeping above a stream at dusk. Adults often rest on the timbers of bridges spanning small streams and may be swept or aspirated from these. Species with reduced male antennae are often found in fair numbers on rocks in streams, congregating just above the splash line in protected places. One merely turns over exposed rocks in streams and aspirates the insects. While these species rarely try to escape by flying, they can run surprisingly fast. A number of brachypterous specimens of *D. leona* Roback were taken in this manner, except that some had actually crawled into the honey-combed passages of pieces of ice between the rocks (Fig. 35). Wading in a stream and turning over the ice ledges by the stream's edge also exposed some specimens of *D. leona* clinging to the underside of the ice ledge or hiding in recesses in the ice.

All but one specimen of my material of *D. nivicavernicola* n. sp. came, as the name indicates, from a small cavern in a snowfield above timber line on Mt. Baker. The cavern, some one to two meters wide, one meter high, and perhaps 20 meters long, had been cut by a meltwater stream, and it had scores of *D. nivicavernicola* walking about on its sides and roof, from which they were easily aspirated or removed with forceps.

On a mild winter day, when the air temperature is near or above freezing, *Diamesa* adults are often found sluggishly walking about on the snow by open streams and are easily collected with aspirator or forceps. Where streams are frozen over except for occasional small ice-free holes, one simply collects at these holes, and one can often find numerous pupal exuviae, as well as adults, at the edge of the ice. Adults and pupal exuviae may also be collected on the splash zone of rocks or debris in streams. Occasionally the adults are only partly emerged from the pupae, giving a valuable adult-pupal association.

Diamesa larvae live free or in loose cases of silk and debris on rocks, sticks, etc., in streams. They pupate in a case of silk and debris and usually completely shed the larval skin from the pupa, although the cast larval skin does remain in the silken case. By carefully collecting these cases, therefore, one is able to get at least a larval-pupal association. If the imago is close to fully formed and is a male, the hypopygium is visible within the pupa, and a complete larval-pupal-adult association is found. I have tried rearing larvae or pupae with mixed success and find simply collecting and preserving pupal cases individually is the easiest way to get associations of the various stages.

Drift traps (Figs. 30-32), used so extensively and successfully for collecting stream chironomids by Brundin (1966), were also used by the author and by R. Hellenthal. Their design follows that of Waters (1962). They proved quite useful for taking larvae, pupae, pupal exuviae, and, occasionally, adults.

The "jeep trap" described in Sommerman and Simmet (1965) was used by K. M. Sommerman to take most of the extensive Alaskan *Diamesa* collection received from the USNM. This interesting trap is essentially a series of funnels mounted above an automobile which lead, via plastic tubes, into a collecting cage in the car. The trap catches anything flying in the slipstream above the car as the vehicle is driven at moderate speeds (to 25 mph.) and was eminently successful, taking 11 species of *Diamesa.*

Placing a Malaise trap over a stream or spring or in a woods, although not done by the author, would seem to be an excellent method of collecting *Diamesa.*

Preservation. — The pros and cons of various methods of preserving chironomids have been reviewed by Schlee (1966). At the start of this study I nearly always pointed specimens, but I have since changed to preservation in 80% ethyl alcohol, as was recommended by Schlee, as the easiest and most generally satisfactory method. *Diamesa* are fair sized chironomids, and specific determinations are usually possible with alcohol specimens. Most pointed specimens, however, must be relaxed and at least the hypopygium cleared in KOH before determination is possible, because the hypopygium dries and distorts. Slide mounts are easily made from alcohol material, at least if the material isn't decades old, and slide mounts are the most permanent way to preserve chironomids and allow the most detailed examination. They are, however, time-consuming to make properly. All things considered, I now feel the best way to treat *Diamesa,* and probably all chironomids, is to collect and preserve the majority in alcohol, but pointing some if possible, clear portions of series in KOH, and slide mount a portion of these cleared specimens. Cleared specimens preserved in alcohol are quite useful, because they allow examination from different aspects. Temporary glycerine slides can also be made from these specimens.

Slide mounting. — Slide mounting of specimens generally followed the procedure of dissection and use of multiple cover slips outlined by Schlee (1966). In my study, the wings of an alcohol specimen were first removed and kept in the 80% alcohol. If pinned or pointed, the specimen was relaxed in a closed jar with a few moist phenol crystals before removing the wings. In either case the body was then heated in 10% KOH for about five minutes, rinsed in distilled water, and then returned to the 80% alcohol with the wings. Wings and body then went to 95% or absolute ethyl alcohol (five minutes), after that to beechwood creosote (two minutes), and finally to balsam on the slide. Quite thin balsam, cut with xylene, was used for initial dissection and orientation on the slide. Four separate areas of balsam (instead of the 11 used by Schlee, 1966) were used on the slide for mounting the various parts. The parts were grouped on the basis of their thickness: the thin wings by themselves, the large thorax and first six or seven abdominal segments together, the head and hypopygium together, and the detached legs and antennae together. The wings were removed from the creosote and positioned in the lower right spot of balsam. The body was then removed from the creosote and laid on its left side in the lower left spot of balsam. The head and hypopygium were detached from the body and positioned in the upper left spot of balsam. In many cases part of the dorsum of the thorax, i.e., the pronotum and mesonotum anterior to the postnotum, was removed from the rest of the thorax and positioned dorsal side up beside the rest of the thorax. The legs from the right side of the body were removed and positioned in the upper right spot of balsam. The antennae (except the scape) were then removed and positioned, one lateral side down, the other medial side down (if possible), with the detached legs. The depth of the balsam on the slide was less than the thickness of the parts being mounted, so proper orientation, once achieved, was maintained. The slides were then dried for a day or two in an oven (55°C) without coverslips. Coverslips (12 mm diameter, round, #2) were then added, using somewhat thicker balsam. Solid glass beads (0.5 mm diameter) were used to support the coverslips to prevent crushing or distorting the specimens. These beads are considerably neater than fragments of coverslips. The slides were then dried for several days in an oven.

To aid in achieving uniform slide mounts, a small plastic slide holder was constructed with the locations for the various parts of the midge and for the coverslips scratched onto its surface. All slides made, therefore, had the various dissected parts in the same relative position. This permitted rapid comparison of a character in different specimens, for once one slide had been positioned and a character located, often under even high power, another slide could be substituted and the character immediately examined without the need to change to low power and locate the particular character again.

The above procedure or that of Schlee (1966) is slow and tedious, and is not always practical for the average worker who does not have the time of a graduate student or a full time technician available to make his slides. One ends up, however, with specimens thoroughly cleared of muscles and other internal matter and with most characters easily visible. They are also as permanent as a slide can be. It is, I feel, well worth the time to make careful slides using either balsam or euparal. Wirth (1961) and Wirth and Marston (1968) recommend a balsam-phenol technique for mounting chironomids. While the technique may be satisfactory on very small Diptera, I found the scores of balsam-phenol slide mounts of *Diamesa* received from the USNM very unsatisfactory. The muscle tissue was not removed or even made very transparent using this method, and crushing and distortion of parts, including the hypopygium, occurred. The presence of muscles and the distortion made examination of many characters difficult or impossible and the use of the slide as a model for an illustration out of the question. While large numbers of slides may be made in a working day with this technique, few if any are, in my opinion, of satisfactory quality.

Mounting portions of chironomids in Hoyer's solution, as was recommended by Roback (1971: 5), is faster than the balsam method, but the slides must be ringed to achieve any degree of permanence.

Labelling. — The time and effort spent collecting should not be compromised by one final but easily passed over point: proper labelling of specimens. The format I adopted for labelling specimens contains, I feel, the minimum data needed to adequately and clearly label a specimen. Additional ecological data could be helpful. Data included were: name of country; name of state or province; latitude and longitude to minute; distance from a town; altitude; date; collector; and how collected. Latitude and longitude to minute and altitude to 200′, at least for the United States, are easily obtained from 1:250,000 U.S. Geological Survey maps. These parameters for many other countries should not be difficult to obtain (see Axtell, 1965). Dates are given with the month printed (abbreviated), not as a Roman numeral or arabic number. The abbreviation "leg.", not "col.", is used before the collector's name, because "leg." means "collected by" only, while "col." could imply "in the collection of." A number of such locality labels are typed using a typewriter with a carbon ribbon. The typed sheet is then photo-reduced to about 28% of its original length and printed on 100 lb. bond text paper. A printed label containing the above information measures about 8 × 18 mm and takes up little space on a slide. A figure of a slide showing the arrangement of the various dissected parts and with such a label appears in Fig. 148.

Adult Morphology

General. — Because descriptions, keys, and classifications are based almost entirely on morphological characters, a good understanding of the morphology of the species considered is desirable to both the author and reader of any systematic work. Unfortunately, many terms used in chironomid works are incorrect morphologically, partly from the lack of a thorough morphological study of the adult, and partly for convenience and the avoidance of changing established usages. One is faced, then, with the choice of retaining well-established but incorrect usages or replacing these with different but more morphologically correct terms. Lindeberg (1964), discussing the various interpretations and terminologies of wing venation, urges that "the nomenclature of descriptive taxonomy should not be changed too often," and he urges the retention of well-established terms rather than their replacement with more morphologically correct ones. While stability is certainly desirable, I do not feel that workers should be bound to vague or incorrect usages when, and if, the correct morphological terms are known. Furthermore, a change to morphologically correct terminology would not be that difficult, and it would, in fact, lead to greater stability of terminology once adopted. No one objected when "chest" of Walker was replaced by "sternopleuron" of Osten-Sacken. And yet, the "sternopleuron" contains no sternal elements — it is entirely of pleural origin, although several recent workers have called it simply the mesosternum, which it definitely is not. "Preepisternum II" is the morphologically correct term, so it is the term adopted in this study. Chironomid terminology is not so stable that a change to correct morphological terms would be difficult. Therefore, when a correct morphological interpretation is possible, I shall use morphological terms, and I urge that these terms be adopted in chironomid systematic literature.

The following study treats the morphology of the adult males of *Diamesa* and is included both as a study of morphology *per se* and to clarify and explain the terms and concepts used in the descriptive part of this paper. Occasionally comparisons with the condition of characters in other groups are included. The morphology section should enable the reader to be certain of what is meant in the descriptions and to compare the terms and concepts used here with those used by other authors. Other studies or discussions of adult chironomid morphology and terminology include Frommer (1967) and Serra-Tosio (1970b), and parts of Mial and Hammond (1900), Schlee (1968), Brundin (1966), Freeman (1955), Fittkau (1962), Saether (1969, 1971), Strenzke (1957a, b, 1959, 1960), and Tokunaga (1932).

Coloration and pruinosity. — Nearly all nearctic *Diamesa,* when alive or preserved dry, are light to dark gray. The medial and lateral scutal stripes appear somewhat darker, particularly when viewed antero-dorsally. These grays may change to browns when specimens are preserved in alcohol. Because of the uniform coloration throughout the genus, I put very little value on color characteristics and note them only briefly or not at all in descriptions.

Fine microtrichia (Fig. 19) on nearly all the sclerites give a slight gray or whitish pruinosity to a dry specimen. The pruinosity is particularly evident between the stripes on the scutum.

Antennae. — Imms (1939) points out that the antennae of insects are of two distinct types: the truly segmented type, found in the Collembola and the Diplura, and the annulated type, found in all higher insects. In the segmented type, intrinsic muscles are present in all but the apical segment, and growth is by division of the apical segment (Imms, 1939; 1940: Fig. 1). In the annulated type, on the other hand, muscles run only from within the head to the basal segment or scape and from the scape to the next apparent segment or pedicel, and growth occurs by divisions of one or more of the proximal "segments" of the flagellum (Imms, 1940). Because the flagellum lacks any musculature and one or more of its proximal divisions may undergo further subdivisions, it seems best to regard the entire flagellum as a secondarily subdivided single segment, and Imms (1939: 316) proposes the term **flagellomere** for its subdivisions. As Snodgrass (1960: 28) emphasizes, these subdivisions are not segments in the sense that the antennal scape, the thoracic and abdominal segments, and the femur and tibia are segments, and they therefore should not be termed segments. Whether the pedicel is a true segment or the basal subdivision of a primitive segment forming the antennal distal to the scape is a question. Imms (1940: 591) suggests that the pedicel could possibly "be regarded as homologous with a segment of the segmented type of antenna which has lost its intrinsic musculature." Snodgrass (1960: 30) feels that the pedicel is a true segment and that muscles running from it to the flagellum have been lost. Matsuda (1965: 64) agrees with this interpretation. Following this interpretation, then, the antenna of a chironomid seems best regarded as consisting of three true segments: a ring-like scape, a large, globose pedicel, and a long, slender, multiannulated flagellum.

The plumose antenna of male *Diamesa* has been regarded as 14-segmented, and a particular flagellomere, for example the fourth, would be called the "fifth segment." This terminology is, however, undesirable for two reasons. In the first place, the so-called multisegmented flagellum, as explained above, is actually a multiannulated single segment. Furthermore, the first antennal segment, the scape, has been generally regarded as being "suppressed" and has not been included in counts of antennal "segments." The scape is, however, quite evident, particularly in slide preparations. Therefore, the statement "male antennae 14-segmented" is incorrect both morphologically and numerically and should not be used. Because the scape and pedicel are always present, while the number of flagellomeres may vary, the number of flagellomeres rather than "antennal segments" should be given in descriptions. Furthermore, a particular flagellomere, for example the fourth, should be referred to as the "4th flagellomere" rather than the "5th segment."

While the male antennae of many species of *Diamesa* are highly plumose like those of most other members of the family, reduction in the degree of plumosity, reduction in the number of flagellomeres, and changes in other features of the antennae occur in several species. For clarity, the "typical" or plumose antenna with 13 flagellomeres will be considered first.

The first antennal segment, the **scape,** is ring-shaped and lies in a large membranous area, the **antennal socket** (Snodgrass, 1935: 109) (Fig. 48). Its ventro-lateral margin articulates with an **antennifer** (Fig. 60), a small sclerotized protuberance near the ventromedial margin of the eye. It articulates with the pedicel on two raised points, one dorsolateral, one ventro-medial (Fig. 48). Similar internally-directed projections serve as sites for muscle attachments. In species with plumose antennae the scape lacks both microtrichia and setae, although well developed setae are present on the scape in some chironomids, e.g., *Lasiodiamesa arientina* (Coq.) (Podonominae) (Saether, 1969: Fig. 3) and female *Protanypus*. A single **scapal seta** is present in some male *D. leoniella* n. sp.

The second segment, the **pedicel,** is large and globose (Fig. 36). Its distal surface is deeply indented for the reception of the first flagellomere. Unlike the scape, it does bear microtrichia and has from zero to four **pedicelar setae** on a small mound ventro-medially. A single campaniform sensillum occurs at the rim of the indentation for the flagellum (Figs. 5, 41). The pedicel has usually been called the scape or first segment in chironomid literature.

The third antennal segment forms the entire **flagellum** and, in the male, is subdivided into thirteen flagellomeres. The first flagellomere (Fig. 39) is about 1.4 times as long as wide and is inserted into a deep socket in the pedicel. It bears a distinct **basal nipple** proximally and is slightly swollen distally, particularly ventrally. The second and third flagellomeres are slightly fusiform, the fourth to twelfth cylindrical. The second through twelfth flagellomeres become progressively longer — the second is about two to two and a half times wider than long, while the twelfth is about as long as wide. The thirteenth flagellomere is much elongate, being some 15 to 25 times longer than wide and from one to nearly three times as long as the length of the preceding flagellomeres together. The terminal 0.15 to 0.20 of the thirteenth flagellomere is slightly enlarged ventrally, then narrowed at the very tip, or "spindle shaped" (Fig. 37). One (or rarely two) **preapical antennal seta** (= *soie preapical,* SPA, Serra-Tosio, 1970b) is found at the tip of the thirteenth flagellomere.

Each flagellomere except the first bears several very long setae which form the plumose male antennae characteristic of the family. The longest of these setae are some 0.50 to 0.65 times the length of the flagellum, and the setae on the dorsal and dorso-lateral surface of the flagellum (= *soies externes,* SE, Serra-Tosio, 1970b) are both slightly more numerous and longer than the setae on the ventral and ventro-medial surface (= *soies internes,* SI, Serra-Tosio, 1970b). These long setae number from zero to three on the first flagellomere, three to six on the second, five to ten on the third, and about 10 to 14 on the fourth to the twelfth; they are numerous on the thirteenth flagellomere. They are arranged in one slightly irregular whorl on the second flagellomere and in two irregular whorls on the third to the twelfth. On the thirteenth they form no definite whorls. Two to six short setae, in addition to the long setae, occur dorso- and ventro-medially on the first through the fifth or sixth flagellomeres. They are quite short on the first and second flagellomeres and are easily distinguishable from the long setae. They become progressively longer on each succeeding flagellomere, however, and by the sixth or seventh they are indistinguishable from the long setae (Fig. 36).

The sockets of the flagellar setae are confined basically to the dorsal and dorso-lateral and ventral and ventro-medial regions of all but the last flagellomere, giving two seta-free bands, one medial and one lateral (cf. Serra-Tosio, 1970b: Fig. 1). The medial band runs from the first to the twelfth or even along the basal 0.1 to 0.2 of the last flagellomere. The lateral band runs almost to the very tip of the last flagellomere and, from about the fourth flagellomere distally, is less well sclerotized and is somewhat infolded, forming the **antennal furrow** (= *sillon antennaire,* sa, Serra-Tosio, 1970b; *Fuhlerrinne,* Schlee, 1968). On the last flagellomere the antennal furrow gradually becomes located more dorsally until near the very tip it may even be somewhat dorso-medial.

Numerous microtrichia are present on all the flagellomeres (Fig. 4).

One important measurement involving the antennae has been widely used in chironomid taxonomy, namely, the **antennal ratio** (AR). The antennal ratio, as used here (cf. Fittkau, 1962), is the ratio of the length of the last flagellomere to the length of the preceding flagellomeres together, including the small basal nipple on the first flagellomere (Fig. 47). Lengths are measured only on cleared alcohol or slide mounted specimens. As Saether (1969) points out, this ratio is quite a bit higher for pinned specimens than for alcohol or mounted specimens of the same species because the fine membrane connecting the flagellomeres shrinks in dried specimens. Edwards (1929: 283), for example, roughly estimated antennal ratios from dry material, and his estimates can not be meaningfully compared to those made on alcohol or slide mounted material.

Several types of sensilla are found on the antennae of insects, and the type, number, and location of these sensilla in chironomids have recently been used as systematic characters. Strenzke (1960: Figs. 1-3) recognizes three types of sensilla in *Clunio:* hyaline, finger-like sensilla basiconica (*Sinneskegel,* Sb); similar but shorter, more slender sensilla basiconica (*Sinneszapfen,* Sz); and sensilla coeloconica (*Grubenkegel,* Sc). Schlee (1968: 65, Figs. 208-209) discusses a type of large sensilla coeloconica occurring in *Corynoneura* and other genera whose margin is ringed with microtrichia; he terms this the "Ringformige Sinnesorgane." Serra-Tosio (1970b) recognizes three basic types of antennal sensilla in *D. zernyi* Edw.: hyaline, finger-like sensilla basiconica (*les sensilles chetiformes,* Scf); large, ringed sensilla coeloconica (*les grandes sensilles coeloconiques a microtriches,* SCc); and slender, elongated sensilla coeloconica (*les petites sensilles coeloconiques,* scc). He also differentiated the broader, blunter sensilla basiconica, the "sensilles chetiformes larges" (= *Sinneskegel* of Strenzke, 1960) from the more slender, more pointed ones, the "sensilles chetiformes etroites."

Serra-Tosio (1970b: Figs. 2-4) discusses the occurrence and distribution of these sensilla on the various flagellomeres in *D. zernyi.* Except for one difference in interpretation, the occurrence and distribution of these sensilla is the same in species with plumose antennae I have examined and is as follows: one ringed sensillum coeloconicum (Fig. 44, 46) both ventrally and dorsally on Flm_1 and dorsally on Flm_2; two or three small sensilla coeloconica (Fig. 44) on Flm_1 and one ventro-medially on Flm_{2-3}; one broad, blunt sensillum basiconicum just ventral to the antennal furrow on Flm_{1-5}; and one similar but smaller sensillum basiconicum (Fig. 44) ventrally on Flm_{1-3}. Serra-Tosio (1970b) interprets the latter sensilla as "sensilles chetiformes etroites." They seem to me, however, to be Strenzke's "Sinneszapfen" — they arise from a fairly obvious pit and are blunt and much shorter than the "sensilles chetiformes etroites" on the spindle-shaped apex of Flm_{13}. I shall call them small, blunt sensilla basiconica. Serra-Tosio (1970b) points out that each has a small sensillum coeloconicum associated with its base. No sensilla are found from Flm_6 up to the spindle-shaped apex of Flm_{13}. Some 40 to 50 slender sensilla basiconica (as in Fig. 1), usually four to six blunt sensilla basiconica, and about four ringed sensilla coeloconica occur on the spindle-shaped apex of Flm_{13}, while two to four small sensilla coeloconica are found at the very apex of Flm_{13} (Fig. 42).

While the antennal sensilla do not reach the degree of development of the "ascoids" in Psychodidae (e.g., Quate, 1955), they do seem to offer some excellent systematic characters. They are, unfortunately, often difficult to identify correctly or even find without oil emersion. The hyaline, finger-like projections of the sensilla basiconica on Flm_{1-5} are so transparent that without oil immersion and phase contrast all one usually sees are the clear, round sockets of the blunt sensilla basiconica just ventral to the antennal furrow. If the antenna has not been sufficiently cleared, the other sensilla, mostly located between the enlarged setal bases, are difficult or impossible to find. Identification of the sensilla on the spindle-shaped apex of Flm_{13} may also be difficult if orientation and clearing are not correct.

"Reduced" antennae. — Reduction in the number and length of the flagellar setae, in the relative length of the ultimate flagellomere (i.e., a lower AR), and in the number of flagellomeres occur in the males of several species of *Diamesa.* A slightly reduced antenna occurs in *D.*

cinerella Meigen (Fig. 38) and a few other species. Here the ultimate flagellomere is shortened (AR about 0.7), and the long setae, while still about 0.65 times the length of the flagellum, are slightly reduced in number to a maximum of about 10 or 11 per flagellomere. Flm_{2-5} are slightly fusiform and about as long as wide. Flm_{6-12} are more cylindrical and progressively longer, and Flm_{12} is about twice as long as wide. The well-developed spindle-shaped apex of Flm_{13} is about 0.4 times the length of Flm_{13}, and the antennal furrow is only weakly developed. The antennal sensilla are as in species with plumose antennae.

More drastic changes are encountered in *D. nivicavernicola* (Fig. 40). The scape and pedicel are reduced in size, the number of flagellomeres is reduced to 10 or 11 (fusion often occurs between two or more of the distal ones), and the longest flagellar setae are only about three times the diameter of the flagellomeres, or some 0.16 times the length of the flagellum. The setae, when present, are arranged in one irregular whorl per flagellomere and number from two to six per flagellomere. Flm_1 is tapered basally and the basal nipple is indistinct. The following flagellomeres are slightly fusiform and progressively shorter, while the ultimate one is distinctly broader and basically cylindrical, with the distal 0.3 tapering to a blunt apex. The AR is down to about 0.35. A large, blunt sensillum basiconicum occurs ventrally at the distal end of each of the first five flagellomeres, while two to five smaller blunt sensilla basiconica occur on the distal regions of each of the flagellomeres but the last (Fig. 4). One to three slender, pointed sensilla basiconica also occur on the three to four preapical flagellomeres (as in Fig. 45). The distal 0.8 of the ultimate flagellomere is covered with numerous long, slender, pointed sensilla basiconica and has about five small, blunt sensilla basiconica and three to five ringed sensilla coeloconica (Fig. 1). All in all, the antenna looks quite like that of a *Clunio* (Strenzke, 1960: Fig. 2).

Even further antennal reduction occurs in *D. leona, D. davisi,* and other species, where only eight flagellomeres are present (Fig. 43). The dorsal region of the scape may be weakly sclerotized, and pedicellar setae are often absent. The shape of the flagellomeres and occurrence and distribution of the sensilla are about as in *D. nivicavernicola.*

Head. — The insect head is a composite structure, formed by the fusion of several segments and the modification of segmental appendages to form feeding organs. Ideally, the segmental boundaries would remain, and naming regions of the head capsule and their setae would be simple and morphologically meaningful. As it turns out, however, sutures delimiting segments in the head are lost, and terminology must be topological and the limits of areas arbitrary.

The large, dorsal region of the head capsule is termed the **vertex.** For our purposes we can regard its borders as the tops of the antennal sockets anteriorly and the top of the occipital foramen (= foramen magnum) posteriorly. The vertex usually bears a prominent Y-shaped **coronal suture** medially (Snodgrass, 1935: Fig. 56A) (Fig. 48). The coronal suture is distinctly produced into the head, forming what are here termed the **coronal apodemes.** Posteriorly the two diverging dorsal arms of the coronal suture end at the occipital foramen and here articulate with the two cervical sclerites. The region between these dorsal arms is termed the **coronal triangle** (Saether, 1971). The coronal triangle bears four short, straight setae arising from large, clear sockets, the **coronal setae** (Saether, 1971). The rear margin of the vertex is also produced dorsad between the arms of the coronal suture, forming a small, pointed triangle (Fig. 48); this triangle is apparently homologous to the **nape** in mosquitoes (Knight, 1970: 28, Fig. 1, Na). The anterior margin of the vertex is simple and distinct in most species. In males with reduced antennae, however, it is produced ventromesad toward the frons and its margin here becomes indistinct or obliterated. It is also produced anteriorly over the scapes in these species, forming what reminds one of misplaced eyebrows (Figs. 52-55).

Two small, clear spots, which appear to be campaniform sensilla, occur medially at the anterior margin of the vertex (Fig. 48). These are, however, possibly much-reduced ocelli. Jobling (1928) shows by sectioning that similar structures in *Culicoides vexans* Staeger (Ceratopogonidae) are actually ocelli and states that "their external structure is essentially similar to that of *Tanypus varius* and *T. choreus.*" Interestingly, Schiner (1864a, footnote on p. XXVIII) noticed "Spuren von Punctaugen" in a few species of *Tanypus.* In the absence of an examination of a section of these organs in *Diamesa,* I shall regard them as probably being small but apparently true ocelli.

The **labrum** in *Diamesa* is non-sclerotized and indistinct (Fig. 48). (A well-sclerotized labrum is present, however, in all Podonominae I have examined.) Immediately above the labrum is the sclerotized **clypeus,** delimited dorsally by the **epistomal** (= frontoclypeal) **suture** running between the anterior tentorial pits (Fig. 48). Above the clypeus is the triangular **frons.** A slender but strong bar, here termed the **interantennal bar,** is usually present, extending dorsad from the frons to the vertex along the mid-line of the head. It seems to be the remains of the mid-region of the epicranial suture and any interantennal sclerotization pushed to the midline of the head by the enlargement of the antennal sockets. Knight (1970: 27) terms it the interantennal groove in culicids. It is not a groove, however, but a slender bar, and I therefore prefer interantennal bar. It is reduced or absent in males with reduced antennae (cf. Figs. 48, 51-55).

Five more-or-less definite setal groups are present on the head of *Diamesa:* the clypeal, interocular, inner vertical, outer vertical, and postocular setae (Figs. 48, 49). In a few specimens of *D. aberrata, spinacies, leona,* and *haydaki,* one or two additional setae, here termed the **medial vertex setae,** also occur, located antero-medially on the vertex (Fig. 51). The number of clypeal setae varies from two to fifteen, being lowest in species with much-reduced male antennae. When numerous, they form no definite groups. If few, however, they may be in two lateral groups (cf. Figs. 48, 51-55). The **interocular setae** (Knight, 1970) (= *soies preoculaires,* Serra-Tosio, 1968: Pl. VII, Fig. 2; Saether, 1971: Fig. 2D) form, in species with plumose antennae, a fairly well-defined group near the dorso-medial margin of the eyes (Fig. 48, 51). In males with reduced antennae, however, the group is more dispersed and located more mesad on the vertex and is sometimes not easily distinguishable from the inner vertical setae (Figs. 53-55). While "preocular" has been used for these setae, "pre-" means before or in front of, and the interoculars are between, not in front of, the eyes. I therefore prefer the term "interocular" which better describes the location of these setae. Vertical setae (Saether, 1971) occur on the vertex on either side of the coronal suture and above and just behind the dorsal part of the eyes. Saether (1971) somewhat arbitrarily divides the vertical setae into inner and outer verticals. In many species of Diamesa, however, the outer verticals are fairly easily distinguishable; they are longer, stouter, straighter, and more erect than the inner verticals and are longer and stouter than the postoculars (Figs. 48, 49). The outer verticals usually merge with the postoculars (= postorbitals), which form a more-or-less uniserial row just mesad to the posterior margin of the eye (Fig. 49). Saether (1971) suggests that the term temporal setae be used to designate the vertical plus postocular setae.

The large **compound eyes** possess coarse, upright microtrichia between, but not on, the ommatidial lenses (Figs. 48, 52-55). These may be longer than the height of the ommatidial lens, in which case they are easily visible under a dissecting microscope and give the eye a "hairy" appearance. In other species they are much shorter, and, at least under a dissecting microscope, the eye appears "bare" (Fig. 51). In all "bare"-eyed species of *Diamesa* I have examined, however, the microtrichia are present, particularly fronto-medially, as is quite evident in slide mounted specimens. Hence "hairy" and "bare" are not absolute terms, but are, instead, extremes in development of these microtrichia. Therefore, in this paper, "hairy" means that the microtrichia are longer than the height of an ommatidial lens and are easily visible along the lateral margin of the eye when the head is viewed from the front. "Not hairy" means that the microtrichia are shorter than the height of an ommatidial lens. Genuinely bare eyes, with no microtrichia at all, occur in *Prodiamesa* (Schlee, 1968).

The shape of the dorso-medial margin of the eye is an important systematic character. In some genera of Diamesinae a dorsal "bridge" some three to five ommatidia high and six to eight ommatidia long extends mesad above the antennal sockets (Fig. 50). In *Diamesa* the eyes are not produced medially. The dorso-medial margin is somewhat truncate in species with plumose antennae (Figs. 48, 51), more broadly rounded in species with reduced antennae (Figs. 52-55). In species with plumose antennae a **dorsal ocular apodeme** may extend mesad from the lower corner of the dorso-medial margin of the eye (Figs. 6, 51). This apodeme is an offshoot of an internal ridge, the **ocular sclerite** (Peterson, 1916: 23, Figs. 142, 145, 147, 149, 154), which runs along the medial and dorso-medial margin of the eye (Fig. 6). A heavily sclerotized, pointed projection, the **ventral ocular apodeme,** extends mesad from the ventral margin of the eye in species with plumose antennae (Figs. 48, 51, 60). In species with reduced antennae, however, the ventral ocular apodeme is absent, and the antero-ventral margin of the eye contacts the tentorium (Figs. 61, 62).

The prominent **tentoria,** visible internally in cleared specimens, have recently been used in chironomid systematics (Schlee, 1968). The tentoria are formed by invaginations of the integument, two anterior (at the lateral ends of the epistomal suture) and two posterior; these unite within the head to form two tubes (Snodgrass, 1935). The points of invagination appear as holes, known as the anterior and posterior tentorial pits. In species with plumose antennae, the tentoria are swollen basally (i.e., at the anterior tentorial pits) but have a more slender, slightly tapered dorsal region (Figs. 48, 60); they also extend just slightly dorsad beyond the posterior tentorial pit. In males with reduced antennae, the tentoria are much more tube-like, that is, the basal region is not swollen (Figs. 61, 62). Schlee (1968) noted a similar trend in *Corynoneura* and other Orthocladiinae and Chironominae. The swollen basal region possibly serves as a point of attachment of muscles running to the antenna and is therefore greatly enlarged in species with large plumose antennae. Saether (1971: Fig. 3) and Schlee (1968: 148) illustrate the tentoria of several genera of chironomids.

Mouth parts. — The mouth parts of *Diamesa,* like the vast majority of chironomids, are modified to form a fluid-ingesting apparatus, and mandibles are completely lost. However, Downes and Colless (1967) recently noted mandibles in an undescribed Australian chironomid with an "unusually elongate proboscis," possibly a Podonominae. This species certainly warrants a more detailed examination.

The **maxilla** in *Diamesa* is, by my interpretation, represented by a **stipes, lacinia,** and five-segmented **palpus.** Saether (1971: 1245) feels that the cardo has fused with the stipes in *Diamesa* and other genera but is partially or completely delimited from the stipes in a few genera, particularly *Lasiodiamesa* (Podonominae). Examination of a *Lasiodiamesa* shows the stipes extending dorsad toward the posterior tentorial pit, with an apparent cardo running first mesad, then dorsad, to fuse with the tentorium at the posterior tentorial pit. Imms (1944: 82) emphasizes that "the close association of the cephalic articulation of the cardines with the posterior tentorial pits is a very constant feature among Nematocera"; Crampton (1942: 33) and Peterson (1916: 37) say essentially the same thing. Peterson (1916: Figs. 257, 259, 260, 261 and 262) illustrates a separated cardo and stipes, with the cardo touching the sclerotized region of the head capsule at the posterior tentorial pit, in several genera of Nematocera. Peterson (1916: 37) states that the stipes in *Chironomus* is connected to the posterior tentorial pit by a slender sclerotized process extending from the stipes and states that this is a reduced cardo. In *Diamesa,* however, the dorsal-most portion of the maxilla is far removed from the posterior tentorial pit, and the region between it and the posterior tentorial pit is entirely membranous (Fig. 49). I feel, therefore, that the cardo has been lost and that the dorsal-most projecting region of the maxilla is still part of the stipes, in contrast to the interpretation by Saether (1971: Fig. 1B).

The stipes in *Diamesa* is produced mesad as a flat plate (Figs. 49, 56). Peterson (1916: 38), as pointed out by Saether (1971: 1245), states that these projections fuse medially to form a continuous plate in *Chironomus ferrugineovittatus* Zett., although Saether (1971) states that this does not occur in any species of *Chironomus* he has examined. These projections do not meet medially in any *Diamesa* examined.

The **first palpal segment** articulates just dorsad to the ventral tip of the stipes (Fig. 56), while the endite lobe, interpreted as the lacinia by Imms (1944: 82-86), articulates to the very ventral tip of the stipes. The lacinia is slender, blade-like, and fairly transparent and bears several seta-like projections at its tip (Figs. 12, 56) (cf. Saether, 1971: Fig. 1C).

The long, prominent maxillary palpi have been described as being four-segmented by all workers except Tokunaga (1936) and Malloch (1915: 410) who, I feel, correctly treat them as having five true segments. That the palpi of chironomids are primitively five-segmented seems evident on close examination of the palpus in a number of genera of chironomids and on comparison with the palpi in other Nematocera and other panorpoid orders. For example, five definite palpal segments are present in the mecopterans *Boreus* and *Nannochorista* (Crampton, 1942: Fig. 2B, 2I) and many Nematocera (Peterson, 1916: Figs. 258, 260, 261, 262, 264, 270; Crampton, 1942: Figs. 2C, 2H, and 2K). An obvious landmark mentioned by Crampton (1942: 34) and Imms (1944: 75, 86-88) is a peculiar **sunken organ** on the third segment in *Nannochorista* (Mecoptera) and many Nematocera. This sunken organ occurs in many chironomids, e.g., most Diamesini, Tanypodinae (Fittkau, 1962: 18), and at least some Podonominae (Brundin, 1966: 75), presumably on the second segment. It seems improbable that this distinctive and widespread organ has moved to another segment in chironomids, however, and close examination of the palpus in *Diamesa* shows, in addition to four well-sclerotized, setous segments, a small but still distinct basal segment. This true first segment is particularly obvious in *Protanypus,* where it is well-sclerotized and bears long setae. In most *Diamesa* the sclerotization of this segment is weaker, and setae are usually absent. This first true segment is, however, obviously present, and it is the segment articulating to the stipes (Fig. 56). In other chironomids the segment may be fairly well-sclerotized and may bear setae (Saether, 1971). So while some chironomids have four well-sclerotized, setous segments, the primitive number is five, and the degree of development of the first segment should be noted in descriptions.

The palpi in *Diamesa* range from fairly long and slender, as in *D. spinacies* (Fig. 51) or *mendotae* (Fig. 56), to quite short and stout, as in *D. leona* (Figs. 55, 57). This can be expressed quantitatively by dividing the length of the palpus from the base of PS_2 to the tip of PS_5 (Fig. 57) by the sum of the widths of palpal segments 2-5; the quotient is here termed the **palpal stoutness.** Long, slender palpi have a high (4.5) value for palpal stoutness, while short, stout palpi have a low (about 2) value.

When present, the "sunken organ" is on the third, not the second, segment. The structure of the "sunken organ" has been described for the ceratopogonids *Culicoides* (Jobling, 1928) and *Forcipomyia* (Barth, 1961). A scanning electron photomicrograph of the organ in *D. mendotae* shows about 30 curved, slightly capitate sensilla arising from a hemispherical pit (Figs. 7, 8, 9, 29). In many chironomid genera which lack this sunken organ there are, instead, several long, slender, pale sensilla, often about at the same location as the sunken organ (cf. Serra-Tosio, 1971: Fig. 138.3; Schlee, 1968: 61). These sensilla seem essentially like those described by McIver and Charlton (1970) on the fourth palpal segment in culicids.

Rowley (1972) has published several scanning electron photomicrographs of the sunken organ in five species of *Culicoides,* and McIver (1971, 1972) and McIver and Charlton (1970) have studied capitate sensilla on the fourth palpal segment in culicids. The external structure of the capitate sensilla in the sunken organ in *Culicoides* is quite similar to that in *Diamesa,* except that in *Culicoides* the distal "head" is more abruptly expanded and the sensilla are less densely arranged within the pit. Two of Rowley's photomicrographs (Rowley, 1972: Figs. 6, 8) show that the individual sensilla arise from small ringed pits; I did not observe this in *Diamesa,* possibly because the sensilla are too closely arranged to see their bases. The surface of the "head" of each sensillum in *Diamesa* is gently wrinkled (Figs. 8, 9), as it is in *Culicoides* (Rowley, 1972: Fig. 11). McIver and Charlton (1970) and McIver (1972) show that the capitate sensilla on the fourth palpal segment in mosquitoes have numerous small (150-180Å) pores on the surface, and Baessler (1958) and Kellogg (1970) have shown that these sensilla, at least in *Aedes aegypti* (L.), are sensitive to CO_2.

Rowley (1972) suggests that the sunken organ in *Culicoides* functions at least in part in detecting CO_2 and suggests that the larger number of sensilla in the sunken organ of ornithophilic species of *Culicoides* reflects a need for the detection of small amounts of CO_2 from a small prey. Mammalophilic species of *Culicoides,* on the other hand, require fewer sensilla because of the greater amounts of CO_2 given off by their larger prey.

The function of this obviously well-developed sunken organ in *Diamesa* is, however, more difficult to explain. It would scarcely be used to detect CO_2 from a prey, and its use as an olfactory organ for food detection seems tenuous, especially when one considers the lack of food available in mid-winter when several species of *Diamesa* do emerge.

A single (campaniform?) sensillum occurs medially at the distal end of the second palpal segment (Fig. 56); Schlee (1968: 61-62) states that this sensillum occurs in all Orthocladiinae and Tanypodinae.

Palpal segments two to five bear setae some one to three times as long as the width of the segment, and they also bear fairly coarse, grouped microtrichia (Figs. 7, 48, 56, 57). The setae on the fifth palpal segment are much shorter than those on the preceding palpal segments; they apparently are the "Halbstarre' Borsten" Schlee (1968: 61) reported in several genera of Orthocladiinae.

The **labium** in *Diamesa* is essentially like that of "*Tendipes* sp." illustrated by Hoyt (1952: Figs. 49A, 50). The large, fleshy, indistinctly two-segmented **labella** were shown by Crampton (1923) to be reduced labial palpi, while the pair of sclerites dorsal to the labella are the prementum (Fig. 49). Peterson (1916: Fig. 312) termed the prementum the theca and the labella the paraglossae in *Chironomus*. Saether (1971: Fig. 1B) illustrates the labium of a *Trissocladius*.

The sclerotized internal parts of the feeding apparatus are the tormae, two strengthening sclerites on the epipharynx (Figs. 11, 59), the cibarial pump, and the labial lonchus. The two **tormae** (= *Befestungen des Kopfinnenplatte,* Schlee, 1968: Fig. 86) extend from the dorsolateral margin of the labrum postero-dorsad to articulate with the cibarial pump (cf. Peterson, 1916: Fig. 531, 532; Saether, 1971: Fig. 4; Schlee, 1968: 59, Fig. 86) (Fig. 59). The **cibarial pump** (Snodgrass, 1959; Saether, 1971) (= *basipharynx,* Peterson, 1916; *pharynx,* Jobling, 1928; *Kopfinnenplatte,* Schlee, 1968; *plaque cephalique interne,* Serra-Tosio, 1970: Fig. 1.2) is a prominent, well-sclerotized rectangular structure with pointed, produced dorsal corners or cornua (Saether, 1971: 1243) (Figs. 48, 58, 59). Ventrally the cibarial pump appears to be produced as a slender triangle, interpreted as the hypopharynx by Peterson (1916: Figs. 531 and 532). Hoyt (1952), as pointed out by Saether (1971), shows that this slender triangle is labial in origin and is better termed the **labial lonchus.** It contains the opening of the salivary duct or **orifice** (= *Porus,* Schlee, 1968) (Saether, 1971) and is fringed with setae distally (Figs. 11, 58, 59). A scanning electron photomicrograph shows that the epipharynx also bears numerous setae distally (Fig. 11). Because the labial lonchus and epipharynx are normally appressed, it is impossible to differentiate the setae on the labial lonchus from those on the epipharynx on most slide mounted specimens. A nearly transparent **pharyngeal pump** (Snodgrass, 1959: Fig. 24) (= *oesophageal pump,* Peterson, 1916: Figs. 531 and 532) is often visible above the cibarial pump (Fig. 58).

While chironomid adults have been regarded as being nonfeeding (e.g., Thienemann, 1954: 244), a well-developed pump for ingesting liquids is obviously present, and the presence of a salivary duct implies some digestion of ingested material occurs. Although I have not seen *Diamesa* feeding at flowers or such semi-fluid food as rotting fruit, decaying vegetation, etc., I have watched them drink droplets of water, and the possibility of ingesting some type of liquid for actual nourishment is certainly possible. Malloch (1915: 288) holds that chironomids visiting flowers are obtaining food there, as "is evident by their actions." If adult chironomids do ingest water or liquid food, the setae and seta-like projections on the labial lonchus, epipharynx, and end of the lacinia (Figs. 11, 12) seem to be adapted to straining particles from such ingested fluids.

Thorax. — The thorax, like the head, is formed by the fusion and differentiation of segments and the incorporation of parts of the appendages. This process of tagmosis has not, however, led to quite the obliteration of segmental boundaries as in the head, and the various sclerites are more easily recognized and homologized.

Many of our present morphological terms for the thorax of insects, such as epimeron, episternum, prescutum, and others, date all the way back to Audoin (1824) (reviewed, compared to other early works in MacLeay, 1830). Somewhat later Osten-Sacken (1881, 1884) proposed a more topological terminology for the pleural sclerites and for the chaetotaxy of the thorax in Diptera, and his terms were adopted by many Dipterists. More thorough studies of the thorax, notably by Crampton (1914, 1919, 1925a, 1925b, 1926a, 1926b, 1942), Young (1921), Matsuda (1956, 1960, 1970), Michener (1944), Ferris (1940a, 1940b, 1950), Snodgrass (1909b, 1927), and Weber (1924, 1928), however, have given us a far better understanding of the origin and evolution of this tagma. Rather than continue using Osten-Sacken's topological terminology, which has been used for the thorax of chironomids and other Diptera, I am applying the interpretations of the above morphologists to the thorax of *Diamesa* and am adopting the morphological terms proposed by them.

Because interpretation and correct naming of the sclerites of a thoracic segment are possible when one understands the basic origin and evolution of the segment, a brief review of the fundamental morphology of the thoracic segments seems worthwhile.

The dorsal sclerite or notum of a wing-bearing thoracic segment is primitively bounded front and rear by an **antecostal suture** externally and an intersegmental **phragma** projecting internally (Snodgrass, 1935: Figs. 36, 39, 96; Matsuda, 1970: Fig. 6) (Fig. 63). According to Snodgrass (1935: Figs. 96, 97), a secondarily membranous strip just before the posterior phragma separates the more posterior, phragma-bearing acrotergite or **postnotum,** which has no connection with the wing, from the more anterior, wing-bearing **alinotum** (= *eunotum,* Crampton, 1942). The alinotum is in turn divided by transverse sutures into an anterior **prescutum,** a medial **scutum,** and a posterior **scutellum** (Snodgrass, 1935: Figs. 96, 100; Matsuda, 1970: Fig. 3). The prescutum is primitively a narrow transverse band delimited anteriorly by the antecostal suture and posteriorly by the transverse or prescutal (Snodgrass, 1935: 180) or **prescutoscutal suture** (Matsuda, 1970: 12). The largest region of the alinotum is the scutum, set off anteriorly by the prescutoscutal suture and posteriorly by the V-shaped (Snodgrass, 1935) or **scutoscutellar suture** (Snodgrass, 1935; Matsuda, 1970). The scutum is in turn partially or completely divided by one or more sutures (Matsuda, 1970: Fig. 3). A pair of **parapsidal sutures** and a pair of **lateral parapsidal sutures** extend posteriorly from the prescutoscutal suture, and the **anterolateral scutal suture** sets off a small sclerite, the **suralare,** which bears the **anterior notal wing process.** The wing attaches to the lateral margin of the scutum. The scutellum follows the scutum and laterally bears the **axillary cords** (Snodgrass, 1935: Fig. 100A), which extends along the rear margin of the squama (Fig. 89).

Because it bears no wings, the pronotum is simpler. It bears no phragma anteriorly (Snodgrass, 1935: Figs. 87, 97), and it lacks the extensive sutures of a wing-bearing notum.

The lateral or pleural region of a thoracic segment has apparently been derived from the proximal region or subcoxa of the coxa (first postulated by Heymons, 1899; elaborated by Weber, 1928; Snodgrass, 1927; Ferris, 1940b; and others). Matsuda (1970: Fig. 14) proposes a pleural region formed of two rings. A slightly modified version of this primitive pleuron appears in Fig. 67. The principal landmarks of this primitive pleuron are the **pleural suture** running from the dorsal coxal articulation to the pleural wing process; a **paracoxal suture** (= pleural costa, Ferris and Pennebaker, 1939; precoxal suture, Michener, 1944) separating the outer (anapleural) ring from the inner (katapleural) ring; and an **anapleural suture** separating the **anepisternum** from the **preepisternum,** Ferris (1940a, b) emphasizes the importance of the ventral coxal articulation arising on the katepisternum (i.e., on a portion of the pleuron and not on the sternum) and the line of meeting of the two preepisterna of a segment on the ventral midline or **discrimen.**

We find a bit more controversy concerning the sternum. Snodgrass (1935) postulates a **spinasternum** on the intersegmental line and a segmental **eusternum** (Fig. 68). A pair of internal **sternal apophyses** project into the thorax from the eusternum (Snodgrass, 1935, Fig. 92). The origin of each sternal apophysis is visible externally as a pit, the **sternal apophyseal pit** (Fig. 68). An internal apodeme or ridge, the **sternacosta** (Snodgrass, 1935: 170, Figs. 93, 94), runs between the two sternal apophyseal pits and divides the eusternum into an anterior **basisternum** and a posterior furcasternum or **sternellum** (Figs. 13, 68). Crampton (1942) is in basic agreement. Snodgrass (1935: 172), however, feels that in the pterothorax of higher Diptera, "the more primitive sutures of the sternal as well as the pleural areas have become almost obliterated and secondary grooves appear which divide the skeletal surface into parts that have little relation to those in more generalized orders." Ferris (1940b), on the other hand, claims that the thorax in Diptera and other orders is much more easily explained and claims that in only a few insects is a truly sternal sclerite, i.e., one arising independently between the subcoxal arcs, ever visible externally in the pterothorax. The sternal sclerites, Ferris holds, are invaginated into the thorax on the ventral midline in the pterothorax, and the mid-ventral region is formed instead by the ventral regions of the converging subcoxae. I basically agree with Ferris.

The prothorax in *Diamesa* is represented externally by notal, pleural, and, with even Ferris agreeing, sternal elements, and internally by a slender transnotal apodeme or ridge, a pleural apodeme on each pleuron, and two sternal apophyses. The pronotum is divided transversely into an anterior pronotum or **antepronotum** and a posterior pronotum or **postpronotum** by a **posterior transnotal suture** (Matsuda, 1970: Fig. 130B) (Fig. 64) (cf. Crampton, 1925a: particularly Figs. 33, 35, 39, and 40). The posterior transnotal suture is produced internally slightly to form a slender transnotal ridge (Fig. 71). The antepronotum in chironomids has been referred to as simply the pronotum. The antepronotum is formed from two sclerites which fuse medially, forming the **medial commissure** (Figs. 71, 78). The antepronotum extends but little anteriorly beyond the large scutum, and it is normally divided dorso-medially by a distinct notch (Figs. 78-81). This notch is usually a simple acute V, with the point of the notch at or just slightly anterior to the scutal process. In species with reduced male antennae, however, the notch may be quite obtuse, and the point of the notch may be located slightly behind and below the scutal process, giving a so-called "gaping" antepronotal notch (Fig. 86). In some specimens of *D. leona* the notch is absent and the dorso-medial region is simply membranous (Fig. 87), while in many brachypterous specimens of this species the antepronotal halves broadly fuse dorso-medially, completely eliminating any notch (Fig. 88). This condition is unique, to my knowledge, in the Chironomidae. Serra-Tosio (1971: 183, Figs. 71, 77) reported the closely-related European species *D. steinboecki* Goetgh. as having the antepronotal halves widely separated. As Saether (1969) points out, the shape of the medial notch may vary a good deal within a genus or even a species, as is shown in Figs. 78-81. In species with plumose male antennae, the fore margin of the antepronotum is fairly straight, and lateral antepronotal setae are confined to the antepronotum's lateral-most region (Fig. 78). In species with reduced male antennae, however, the anterior margin of the antepronotum is concave antero-laterally, giving the fore margin a sinuous outline, and the lateral setae are more dispersed mesad (Figs. 86-88). A slender bar usually extends a short distance mesad from the antero-ventral margin of the antepronotum (Fig. 71).

The postpronotum is divided into two lateral regions which appear, at first glance, to be part of the scutum (Fig. 64). Indeed, they have been regarded as such — they are the "humeral callosities" or "humeri" of higher Diptera (e.g., Curran, 1965). These lobes are fairly well delimited from the scutum by an antecostal I suture postero-dorsally, but they fuse with the scutal area dorsally and the mesopleural area ventrally. In most species of *Diamesa* a long, slender apophysis, here termed the **postpronotal apophysis,** extends internally from the posterodorsal region of each postpronotal sclerite (Figs. 13, 71, 78). From its location, I would interpret this apophysis as a derivative of the lateral ends of the intersegmental phragma. A small, clear spot at the postero-dorsal margin of the postpronotum apparently marks the region of invagination of the postpronotal apophysis. This spot could thus be termed the **postpronotal apophyseal pit** (Fig. 64).

The postpronotum in *Diamesa* bears no setae or other obvious structures. Along its antero-dorsal border are a few tiny spots (Fig. 64), possibly campaniform sensilla. Saether (1971: Figs. 5 and 6) indicates that similar small structures occur in *Parachaetocladius* and *Rheocricotopus,* and Coe (1950: Fig. 195a′) figures a "prothoracic sensory pit" on the postpronotum in several subgenera of *Chironomus.*

Turning to the pleural region, one sees a well-defined sclerite located ventral to the antepronotum (Fig. 66). **Pleural suture I** runs approximately horizontally across this sclerite and divides it into two regions, a postero-ventral epimeron I and an antero-dorsal region, which would appear to be episternum I. Ventro-mesad to the apparent episternum I, however, but separated from it by a membranous region, is another sclerite which bears the ventral coxal articulation (Figs. 69, 71). This sclerite is, thus, **katepisternum I,** so the two regions of the more dorsal sclerite would then be **anepisternum I** and **epimeron I** (Fig. 66). The latter is not divided into an- and katepimeral regions. The internal **pleural ridge I** is produced antero-ventrad well beyond the margin of epimeron I; at the very end of this projection is the dorsal coxal articulation (Figs. 66, 71). Anepisternum I is produced into a long arm running antero-mesad (Fig. 71), and the cervical sclerite articulates to this elongation of anepisternum I. Viewing the thorax ventrally (Fig. 69), the katepisterna I are seen to fuse with a sclerite which bears the pair of internally-directed sternal apophyses. This sclerite is thus **eusternum I** and is the only externally-visible sternal element in the thorax of *Diamesa.* Eusternum I fuses with the antero-ventral regions of the preepisterna II and is divided approximately in half by an internal ridge running transversely across the sclerite. This internal ridge seems to clearly be the **sternacosta** (Snodgrass, 1935: Figs. 92A, 93C), and the sternal apophyseal pits extend antero-laterad from the ends of this ridge. Eusternum I is thus divided by the external mark of this ridge, or the **sternacostal suture**, into an anterior **basisternum I** and a posterior **sternellum I** (Figs. 13, 69).

The strong **sternal apophyses**, visible in cleared specimens, extend to and fuse with pleural ridge I (Fig. 71). (Saether, 1971: Fig. 5, st I, mistakenly labelled the sternal apophyses as sternum I). About halfway up their length each sternal apophysis bears a slender mesal projection, while the dorsal half of the lateral border fuses with pleural ridge I (Figs. 13, 71). The sternal region of the prothorax is thus solidly fused with the pleural region.

The externally-visible sclerites of the greatly enlarged mesothorax are all of either notal or pleural origin — any sternal sclerites have been invaginated into the cavity of the thorax on the mid-ventral line. The notal regions are the prescutum, the scutum (the so-called "mesonotum"), the scutellum, and the postnotum. As Crampton (1942) emphasizes, the notal region of the mesothorax, that is, the true mesonotum, extends from the anterior to the posterior mesonotal phragma (Fig. 65). The use of the term mesonotum to designate the scutum is not correct and should not be followed.

The **prescutum** in Diptera has been variously interpreted. Crampton (1925a: Figs. 11-14, others, *psc;* 1942: 46-48, Figs. 6A, C, E, F, *psc*), Hendel (1928: Figs. 18-20), and Weber (1966: Fig. 197b) regard the anterior portion of the scutum as the prescutum. Crampton (1942: 47) defines the prescutum as the region of the insertion of the longitudinal flight muscles. Snodgrass (1935: Fig. 101D, E) and Matsuda (1970: 13, Figs. 130A, B, 132A), on the other hand, interpret the prescutum in Diptera as having been separated or much constricted medially and pushed laterally by the extreme anterior development of the scutum. To interpret the prescutum, let us look again at some landmarks on the primitive notum (Fig. 63). Note that the antero-lateral scutal suture, the lateral parapsidal suture, and the lateral end of the prescutoscutal suture meet at one point. Matsuda (1970: 13) emphasizes that this point of meeting is an important landmark, and it is a landmark we can easily find in *Diamesa.* By locating the tergal fissure, anterior notal wing process, and first axillary sclerite, we can find the suralare near the rear of the scutum (Fig. 64). The anterior end of the suralare meets the lateral parapsidal suture, so the prescutoscutal suture would be the suture extending along the lateral margin of the scutum, and the prescutum would be the long, slender sclerite just below this suture. While the prescutum is small in *Diamesa,* it is quite well developed in other *Nematocera* (cf. Crampton, 1925a: Figs. 33, 37, 39, 40, *pat*$_2$). The prescutum is the paratergite of Crampton (1925a, 1942) and Knight and Laffoon (1970b).

The main dorsal sclerite of the thorax of a chironomid is the scutum, morphologically but scarcely topologically posterior to the prescutum. The scutum in *Diamesa* is partially subdivided by two pairs of incomplete sutures. A short **parapsidal suture** (Matsuda, 1970: Figs. 3, 130, 132A) with an internal apodeme arcs dorsad from the lateral scutal margin just above the anterior spiracle (Fig. 64), while the **lateral parapsidal suture** (Matsuda, 1970: Figs. 3 and 132A) or supraalar suture partially sets off the **supraalar callus** (Fig. 64). The posterolateral scutal suture (Matsuda, 1970: Figs. 3, 130A, B, 132A) is absent.

The **scutum** bears three darkened areas or "stripes," one medial and two lateral, marking the insertion of the longitudinal and vertical flight muscles, respectively (cf. Freeman, 1955: Fig. 2). In dry material these stripes appear slightly darker and have less pruinescence than the rest of the thorax. In cleared specimens of many species they are scarcely discernible. The antero-medial margin of the scutum is usually slightly produced anteriorly, forming the **scutal process** (= *Mesonotalfortsatz, mesonotal process,* auct.) (Fig. 78). A small roughened or tuberose oval area, the **humeral scar,** is located just anterior to the dorsal end of the parapsidal suture (Fig. 65). About at the base of the parapsidal suture the scutum projects slightly laterad, forming the **scutal angle** (Knight and Laffoon, 1970b) (Fig. 78). A similar lateral projection, the **prealar callus,** occurs just before the wing (Fig. 78).

Only two groups of setae are normally found on the scutum of *Diamesa.* The **dorsocentral setae** (DCS) (= *Dorsolateralborsten*) are typically arranged uniserially in two parallel, longitudinal rows. Often they are slightly staggered posteriorly, particularly if numerous (e.g., *D. mendotae,* Figs. 82, 83). What appear to be tiny clear dots (?*Fensterfleckchen,* Schlee, 1968) also occur in or near the dorsocentral setal rows (Figs. 7, 82, 85). In *Diamesa* the number of dorsocentral setae per row varies from one (in *D. leoniella*) to over 20 (*D. mendotae*). Just dorsal and anterior to the wing are the **prealar setae,** confined to the posterior region of the prealar callus. **Acrostichal** (= *dorsomedial, Dorsomedianborsten*) **setae** are consistently present only in *Diamesa leoniella. D. leona* occasionally has a single acrostichal seta, and one specimen of *D. lindrothi,* Goetgh. examined has a single acrostichal seta.

The **supraalar callus** bears no setae in *Diamesa,* although **supraalar setae** are present there in other chironomids. These setae have been called the "Postalarborsten" (Pagast, 1947). Brundin (1956), however, correctly points out that these setae are above, not behind, the wing, and should thus be termed "supra-," not "post-," alar. The region also bears an interesting little postero-lateral patch of short, stout microtrichia which, when the wing is folded, contacts a similar group of microtrichia on the end of the third axillary sclerite (Figs. 19, 89). The supraalar callus also has a distinct fissure laterally, the notal incision (Crampton, 1928: 114, Figs. 1-4) or **tergal fissure** (Matsuda, 1970: 312, Figs. 130, 132A) (Figs. 64, 92).

The **scutellum** bears little of systematic interest except the scutellar setae, which vary in arrangement, number, and length (cf. Figs. 65, 75, 76, 86-88).

The posterior-most division of the mesonotum, the **postnotum,** bears no setae in *Diamesa* and is divided antero-medially by a medial fissure or cleft (Figs. 73, 78). Interestingly, this medial fissure is reduced or even absent in some brachypterous specimens of *D. leona,* as it is in the subfamily Podonominae. The postnotum also usually has a definite suture on the mid-line postero-ventrally (Fig. 72). The postnotum, viewed laterally, usually has a fairly sharp postero-dorsal corner (Fig. 64); in some species with reduced male antennae and in *D. lindrothi,* however, the postero-dorsal margin is rounded (Fig. 76). The intersegmental phragma, or phragma II, appears as a ventral extension of the postero-lateral regions of the postnotum (Figs. 64, 72). This phragma is scarcely developed in the brachypterous form of *D. leona* (Fig. 76) because of the loss of the longitudinal flight muscles.

The remaining external regions of the mesothorax are all of pleural origin. Remembering our landmarks, we can start at the dorsal articulation of coxa II and trace the internal **pleural apodeme II** running antero-dorsad to merge with a strong internal ridge or apodeme which runs between preepisternum II and katepisternum II (Fig. 66). This latter apodeme is an internal projection of part of the paracoxal suture (Matsuda, 1970: 35 and Fig. 14); it is here termed the **paracoxal apodeme.** Pleural suture II then continues in a conspicuous straight course to the pleural wing process. Near the ventral end of the vertical portion of pleural suture II is the **pleural apophyseal pit,** marking the origin of the **pleural apophysis** (Fig. 66). Pleural suture II divides the mesopleuron into an anterior episternum II and a posterior epimeron II.

Actually, the dorsal coxal articulation and lower-most part of the pleural suture have undergone an interesting posterior displacement in chironomids, and one could possibly mistake the suture between epimeron II and anepisternum III (Fig. 66) as the pleural suture. The straightest pleural suture II I have observed is in the Podonominae. In *Lasiodiamesa*

(Fig. 77), for example, pleural apodeme II merges with the strong paracoxal apodeme at a fairly acute angle. In other genera pleural apodeme II forms nearly a right angle with the paracoxal apodeme.

A strong **anapleural suture** runs from near epimeron I to just above the pleural apophyseal pit and separates the more dorsal **anepisternum II** from **preepisternum II.** Anepisternum II is in turn divided into three regions. The anterior region is postero-ventral to the mesothoracic spiracle and fuses antero-dorsally with the postpronotum; it is here termed **anteanepisternum II.** It is often weakly sclerotized anteriorly, and in many species this weakly sclerotized region forms a more or less distinct opening, the **anteanepisternal pit** (Fig. 66). The posterior region of anepisternum II, or **postanepisternum II,** is a triangular sclerite just anterior to the upper part of the pleural suture. These two anepisternal regions are separated by a large membranous area in which is found a large, well defined sclerite This sclerite, here termed the **medioanepisternum II,** bears a strong apodeme dorsally (Fig. 91) and is connected to the scutum by a small sclerite, the **prealare** (Crampton, 1925a: Figs. 2, 13, 14, 16, 20, *pra*) (Fig. 66). In nearly all *Diamesa* its ventral margin is smoothly rounded and well defined. In *Lasiodiamesa,* however, the medio- and post-anepisternum II are separated only dorsally (Fig. 77). They are also only partially separated from each other in *Protanypus* (Crampton, 1925a: Fig. 35).

A well defined **basalare** (Fig. 66) is connected to post-anepisternum II by a thin bridge.

The large sclerite below the anapleural suture, often called the "mesosternum," is **preepisternum II.** Viewed laterally, preepitsernum II is usually broadly rounded antero-ventrally and a distinct, long anapleural suture is present (Fig. 66). In brachypterous *D. leona,* however, this border is nearly straight from sternellum I to near coxa II, where it bends sharply dorsad (Fig. 76). Serra-Tosio (1971: 184, Fig. 71) observed the same condition is *D. steinboecki.* The anapleural suture is much reduced in these forms, as it is in the "Clunioninae" (Wirth, 1949). Apparently this reduction in the length of the anapleural suture is connected with brachypterism and a walking rather than flying existence with copulation occurring on the ground. The reduction has occurred independently in *Diamesa,* "Clunioninae," and possibly other brachypterous chironomids. Schlee (1968) noted a trend to a shortened anapleural suture in some *Corynoneura,* and Brundin (1956: 45) mentioned the same in a few other genera.

Viewing the thorax ventrally, one sees the preepisterna II meeting on the ventral midline, termed the discrimen by Ferris (1940a) (Fig. 69).

While setae are, as a rule, absent from preepisternum II in *Diamesa,* a few small, dorsal preepisternal II setae occur in some specimens of *D. leona, leoniella,* and *davisi* just ventral to the anapleural suture (Fig. 75). Serra-Tosio (1971) reported the same in *D. steinboecki.*

The remaining division of episternum II, **katepisternum II,** is quite small but still visible in many Culicoidea (sensu Stone, et al, 1965). Crampton (1925a) shows it in his Figs. 27, 29, 30, 33, 37, 39, 40, and 41. Interestingly, one can pick out the Culicoidea in Crampton's figures by merely looking for the presence of katepisternum II or "ptn" of Crampton (Fig. 29, a *Bibio,* is the sole exception). In *Tipula reesi* (Rees and Ferris, 1939: Fig. 78) and *Sphaeromias* (Fig. 70) katepisternum II is seen extending in an unbroken arc between coxa II and preepisternum II from the dorsal to the ventral coxal articulation. In *Diamesa* the middle part of this arc has been lost, leaving only a slender region near the dorsal coxal articulation and a small ventral portion (cf. Figs. 66, 69). The latter bears the ventral coxal articulation and fuses with its homologue from the other side to form a ventro-medial plate (Fig. 69). This ventro-medial plate in Diptera, if named at all, has usually been regarded as being sternal (e.g., Knight and Laffoon, 1970b: 135, Fig. 24, *Mes;*). The presence of the ventral coxal articulation, however, seems to me to clearly show a pleural origin for this sclerite, as Rees and Ferris (1939: 149-150) strongly advocated.

Epimeron II bears a slight protuberance postero-dorsally, and this usually bears a few fine setae (Fig. 66). In many species there is a small, pale area just behind the end of the anapleural suture.

The greatly reduced metathorax is more difficult to interpret. Running antero-dorsad from the dorsal coxal articulation is a small sclerite, probably formed by the fusion of **preepisternum III** and **epimeron III** (Fig. 74). This same sclerite extends as a slender bridge ventrally between coxa II and III. Viewed ventrally, it is seen to fuse with its homologue from the other side, forming, as in the mesothorax, a ventro-medial plate bearing the ventral coxal articulations (Fig. 69). This bridge is thus **katepisternum III.**

The large sclerite just posterior to epimeron II, containing the metathoracic spiracle in a large membranous region, would seem to be **anepisternum III.** It is moderately produced laterally along its postero-dorsal margin (Fig. 72). Immediately above anepisternum III, supported on a finger-like process, is the haltere. Because it is a reduced wing, the haltere should have pleural suture III running to its base. One can not, however, easily trace a pleural suture or pleural apodeme in most species. What is possibly pleural suture III is shown in Fig. 74.

To interpret the metanotum, bear in mind that the wing attaches to the lateral margin of the scutum. Since the haltere is reduced wing, the haltere would obviously attach to the lateral margin of the scutum of the metanotum. We know, therefore, that the small sclerite just mesad and dorsad to the base of the haltere (Figs. 73, 74) is in part or totally metascutal. Since a prescutum III is not discernible, I would interpret this small sclerite as being **scutum III + prescutum III.** A small sclerite just behind it would seem to be **scutellum III** (Figs. 73, 74). The postnotum of the metanotum is more easily seen and identified. Dissection shows the longitudinal dorsal muscles of the metathorax running from the rear surface of phragma II to the area shown in Fig. 72. This would, therefore, be **phragma III,** and the small region anterior and the thin region dorsal to it are thus **postnotum III** (Figs. 72-74).

Each thoracic segment bears four internal projections or apophyses, two pleural and two sternal (Weber, 1933: Fig. 120; 1966: Fig. 44a; Snodgrass, 1935: Fig. 92A) (Fig. 68). In the meso- and metathorax of most Pterygota the bases of the sternal apophyses are approximated and fused together, forming the Y-shaped **furcae** (Snodgrass, l.c.; Weber, 1933: Fig. 134). These furcae in *Diamesa* show up only in cleared specimens and really need to be removed for proper observation. They are rather pretty little structures (Fig. 72), although their inaccessability prevents their common use in descriptions. Tokunaga (1932) illustrates and discusses the sternal apophyses in *Pontomyia pacifica.*

Wings. — Except for the brachypterous form of *D. leona,* the wings of all nearctic *Diamesa* extend to or nearly to the end of the hypopygium. When at rest, they are folded to resemble an acute "peaked roof" over the abdomen, with their rear margins touching (Fig. 149). In species with plumose antennae, the wings are fairly slender, there is a slight narrowing of the wing posteriorly just distal to the anal lobe, and the anal lobe is slightly acute (Fig. 93). In species with reduced antennae, on the other hand, the wing is proportionally much broader, the narrowing of the wing just distal to the anal lobe is less pronounced, and the anal lobe is right-angled or obtuse (Figs. 98, 99).

The dry wings of a pinned specimen show iridescent coppers, violets, greens, and blues under reflected light; under transmitted light they are just slightly opaque. This coloration is related to the size of the microtrichia on the wing membrane (Edwards, 1929: 336). In *Diamesa* the microtrichia appears as numerous closely spaced dots at about 100× and usually appear as short, stout, hair-like structures at 650×.

Edwards (1929: 336) used the size of the wing microtrichia to separate subgenera or species groups. Except for the extremes in microtrichia length, I have found this character difficult to use. Wings with very large microtrichia, such as *Boreoheptagyia lurida* (Garrett) (Fig. 14, 15), appear "punctured" when examined dry. The wing microtrichia in *Potthastia* (Figs. 17, 18), on the other hand, need a very high magnification (900 ×) to be seen. A wing with such fine microtrichia appears, when dry, slightly white or "milky" under a dissecting microscope; in alcohol it is nearly transparent. Between these extremes are "finely punctured," "slightly opaque," "faintly grayish," etc. Long, very short, and moderately-developed microtrichia are shown in Figs. 14-18.

The border of the wing bears a fringe of setae. These are short and slightly curved along the anterior border but become long and straight along the posterior border, where they alternate, one long, one or two short. They are longest on the anal lobe. The squama is also heavily fringed with setae. At the very anterior base of the wing is a membranous **tegula,** covered with microtrichia and several campaniform organs, while just distal to the tegula is a sclerotized **humeral plate** (Snodgrass, 1935: Fig. 122) (Fig. 89). Between the fringed anal lobe and the squama is the **alula.** This lacks any fringe of setae in male *Diamesa* except in the unusual *D. nivicavernicola* where four to nine alular setae are present.

Wing venation characters have been extensively utilized in chironomid systematics, both in descriptions and classification. Several different systems of naming the wing veins have been used during the last 130 years, however, making it sometimes difficult to understand older descriptions correctly. Subcostal and cubitus, for example, have been used by different authors for quite different veins. In addition, different opinions on the correct homologies of the veins and crossveins have led to different terminologies.

Such early authors as Fabricius, Meigen, or Zetterstedt made little use of venational characters in chironomids. Walker (1856) did utilize both configuration and coloration of wing veins, but his terminology is unclear. Schiner (1862: X-XV, Taf. I, II) carefully explained his venation terminology and even diagrammed a chironomid wing. Schiner (1864b) subsequently proposed a similar interpretation, but he here named rather than numbered the veins. His system was adopted by Kieffer and, in his earlier papers, by Goetghebuer. Skuse (1883, 1889) followed the terminology proposed by Loew (1862).

Comstock and Needham (1898, 1899) showed the important role of pupal or nymphal tracheae in vein formation and added greatly to our understanding of venation. Their terminology, borrowed from Schiner and other early authors, was adopted by many workers. Comstock and Needham's interpretation of the branching of the media and cubitus in Diptera, however, was criticized by Tillyard (1919), who showed that the media is actually four- rather than three-branched. Most chironomid workers continued to follow the Comstock-Needham system. Tokunaga (1936) adopted Tillyard's modification quite early, as Freeman (1955) and Oliver (1959) did later. More recently Lindeberg (1964) argues that part of Tillyard's modification may not be correct and points out that the "base of M_{3+4}" of Freeman and Oliver may be a secondarily acquired cross-vein. Lindeberg (1964) further argues that R_1, R_{2+3}, and R_{4+5} are possibly actually R_1, R_2, and R_3, respectively. Until further studies give conclusive evidence for changing the terminology of the radial branches, I shall follow essentially the Tillyard modification of the Comstock-Needham system, except for calling "base of M_{3+4}" "apparent m-cu." A few of the various terminologies and interpretations used by different authors are outlined in Table I (pp. 145).

The venation of *D. mendotae* is typical of the genus and is shown in Fig. 93. The costa (C) does not reach the base of the wing; it becomes distinct about at the humeral cross vein (h) and from there runs along the fore margin of the wing to extend beyond the end of R_{4+5} about six times its own diameter (Fig. 145). It ends just before the wing tip. The strongly concave subcosta (Sc) is very weak and appears like a fold proximally; it all but disappears distally.

The basal 0.1 of the radius is enlarged and strongly sclerotized. Viewing the wing ventrally shows that the radius is closely associated with the base of the subcosta to form what Lowne (1890-92: 199, 201-202, Pl. X, 2) termed the **remigium** (= *Stammader,* Schlee, 1968: 69; stem vein, Edwards, 1929: Fig. 1; *not* remigium *sensu* Snodgrass, 1935: 225). The remigium (Fig. 89) may be likened to a forearm and hand. The proximal end of the remigium fits something like a cupped hand over strong dorsal projections of the first and second axillary sclerites. Immediately distal to this cupped region the remigium is quite weakly sclerotized, forming a line of flexion (at the anterior end of the line of flexion *bf* of Snodgrass, 1935: Fig. 122), something like a wrist joint. Distal to this the "forearm" region of the remigium is strongly sclerotized and inflexible; at its "elbow" region it is tapered to a point. A small, strong, L-shaped sclerite, interpreted as the **arculus** by Wirth (1952), is found at the tip of the remigium (Figs. 89, 90). The proximal region of the arculus lies along the anterior margin of the elbow, while the distal end swings around the elbow and extends posteriorly to the base of Cu. A small extension of this tip usually extends beneath the base of Cu (Figs. 89, 90). Rodova (1971: 43) suggests that the arculus acts as a pivot or hinge, as is indeed seen to be the case. One can flex the extended wing of a *Diamesa* on its longitudinal axis and see that, while the hand of the remigium itself does not move, rotation of the wing occurs at two points. First, the forearm rotates slightly, pivoting on the weakly sclerotized wrist. Most of the rotational movement of the wing, however, is seen to be about the elbow of the remigium, and one can see that the posteriorly-projecting hook of the arculus serves to connect the anterior and posterior regions of the wing and help them flex as a unit.

The hand of the remigium, in *Diamesa,* bears one to four fairly strong setae. One or two weak setae are usually found just distal to the wrist, and, just distal to these, is a group of about four small and about ten even smaller sensilla, probably campaniform sensilla. A row of three fairly large campaniform sensilla and a group of from eight to twelve smaller campaniform sensilla and from one to four setae occur near the distal end of the remigium (Fig. 90).

The main truck of the radius emerges from the anterior region of the arculus and runs parallel to the costa until r-m. Here it forms three branches. R_1 and R_{4+5} are strong, convex veins which reach the wing margin. R_{2+3}, however, is weak and concave and all but fades out before the costa.

Connecting R_{4+5} and M is a strong, convex, slightly arched "r-m cross-vein." In many slide mounts one can see a trachea running through r-m, so r-m seems to me to actually be part of R_{4+5}. If the so-called R_{4+5} is actually R_3 as Lindeberg (1964: Fig. 6) suggests is possible, "r-m" may have resulted from the loss of the true R_{4+5} as shown in Figs. 94-97. Further evidence for interpreting the posterior branch of R as R_3 is the presence in most Diamesini of a darkened, convex band just anterior to the distal third of M_{1+2} (cf. Lindeberg, 1964: Fig. 6). In female *Pagastia orthogonia* Oliver this band bears a number of setae. According to Tillyard (1918: 634), the presence of setae suggests that this is a remnant or vestige of a vein, in this case R_5. A weak concave fold midway between "R_{4+5}" and M_{1+2} is possibly a vestige of R_4, while a possible vestige of M_2 appears as a convex, darkened band just posterior to M_{1+2} (cf. Lindeberg, 1964: 150, Fig. 6). In many female *Pagastia orthogonia* both the "vestige of R_4" and the "vestige of M_2" also bear setae, at least distally.

The media emerges simply as a trachea from the base of Cu just distal to the arculus; it briefly arches anteriorly, then straightens and runs to the r-m cross-vein (Figs. 89, 93). Just beyond r-m it weakens and runs as a weak, transparent vein to the margin of the wing, ending just behind the wing tip. The apparent m-cu cross-vein is little more than a trachea, with no sclerotization or brown coloring except at its very ends. In favorable material one can trace this trachea running along the rear margin of the squama, across the base of the alula, to the strong base of Cu, and thence in Cu to where it leaves and joins M (Figs. 89, 93). This trachea looks enough unlike a vein that Singh (1958) described two Diamesini from Nepal as an *Orthocladius* and a *Trichocladius,* stating for the former that "position of mCu cross-vein with tracheal spiral." Lindeberg's (1964) suggestion that this so-called m-cu is actually a secondarily acquired cross-vein seems reasonable.

M_{3+4} is pale and fairly straight; it fades just before the wing margin. The cubitus (Cu) originates at the rear end of the arculus. It is pale basally but becomes slightly brown near "apparent m-cu." Cu_1 is pale and straight basally, but it curves posteriorly slightly at its distal end. Just behind Cu is a fold, quite strong proximally but becoming weaker beyond apparent m-cu; this is the **vannal fold** (Snodgrass, 1935). A very weak anal vein extends to very near the tip of Cu_1.

In addition to configuration, other characters of venation are useful. C, R_1, the basal part of R_{2+3}, R_{4+5}, r-m, and M just proximal to apparent m-cu are quite brown; the rest of the veins are pale. R_1, R_{2+3}, and R_{4+5} bear small campaniform sensilla (= stigmal sensilla, Saether, 1971) and several setae; the number and arrangement of both of these are useful. The subcosta also bears a few sensilla ventrally just beyond the arculus (Fig. 90).

The axillary sclerites at the base of the wing conform very well to the basic pattern given by Snodgrass (1935: Fig. 122) and Matsuda (1970: Fig. 4). After one becomes a little familiar with them, they can be easily homologized with those of *Tabanus* (Bonhag, 1949: Fig. 16), *Tipula* (Rees and Ferris, 1939: Figs. 82A, B), and the species illustrated by Crampton (1928: Figs. 1-4). Again looking for definite landmarks, one can locate the first axillary sclerite by finding the anterior notal wing process (Snodgrass, l.c.: ANP). This is a small, short projection located just below and behind the prealar setae on the posterior-most region of the suralare (Figs. 64, 92). Favorable slide mounts or dissections show an anterior finger-like projection of the first axillary sclerite lying over the ANP. This projection articulates with the antero-ventral region of the hand of the remigium, that is, to the region apparently formed by the subcosta (Fig. 89). The enlarged posterior region of the first axillary is just barely visible from above as a brown sclerite lying nearly vertically; it articulates with the pleural margin of the supraalar callus just posterior to the tergal fissure (Fig. 92).

One can most easily find the second axillary sclerite by viewing the thorax from the side and following the pleural suture dorsally to its end, the **pleural wing process** (Snodgrass, 1935; Fig. 91B, *WP*) (Figs. 66, 91). A ventro-lateral projection of the second axillary articulates to the pleural wing process, while a dorsal projection supports the posterior margin of the hand of the remigium (Fig. 89). The second axillary also articulates to the first axillary along its dorso-medial margin.

By extending and folding back a wing of an alcohol specimen, one can easily find the main **line of flexion** (Snodgrass, 1935: Fig. 122, *bf*) along which the axillary and main part of the wing fold when the wing is flexed back along the abdomen (Snodgrass, 1935: Fig. 133). This line of flexion marks the location of two plates. The **distal median plate** (Snodgrass, 1935: Fig. 122, *m′*) has a rather clear connection to the rear margin of the forearm of the remigium just distal to the wrist. The **proximal median plate** (Snodgrass, l.c., *m*) is smaller and is simply a proximal continuation of m′; the line of flexion between these two plates is sclerotized but flexible (Figs. 19, 89).

The third axillary sclerite is less well defined. It occupies approximately the basal half of the squama and extends from the base of the wing to an interesting raised area on the base of the squama which is covered with numerous short, slightly curved or hooked microtrichia (Figs. 19, 20, 89). This structure, as pointed out by Rodova (1968, 1971), helps fasten the wing to the body when the wing is at the rest position. The third axillary articulates posteriorly to a fairly well defined **posterior notal wing process** (Snodgrass, l.c., PNP) (Fig. 89). Anteriorly it articulates to the second axillary. When the wing is extended, the third axillary is approximately horizontal. Flexion of the wing back along the body involves swinging the distal end of the third axillary, i.e., approximately the region of the microtrichia-covered hump, dorsad and mesad until the third axillary stands approximately vertically (cf. Snodgrass, 1935: Fig. 133). The patch of hooked microtrichia on the third axillary and that on the supra-alar callus are then in contact, and the wing is held in the rest position by the interlocking hooked microtrichia.

Halteres. — The halteres consist of a slightly swollen base or **scabellum,** a slender stalk or **shaft,** and an expanded distal **capitellum** (Crampton, 1942). In *Diamesa* the scabellum and most or all of the shaft are usually brown, while the capitellum is a pale white or light yellow. Although earlier workers usually noted the coloration of the halteres, this character seems quite variable in *Diamesa.*

Legs. — The legs of insects consist of six true segments: the coxa, trochanter, femur, tibia, tarsus, and posttarsus. Although the trochanter in *Diamesa* is solidly fused to the femur, the trochanter is primitively a musculated, freely articulated segment (Snodgrass, 1935: 197). The tarsus, on the other hand, is like the flagellum; it is a secondarily-subdivided single segment, and its subdivisions are termed **tarsomeres** (Snodgrass, 1935: 198).

In naming the locations of setae, spines, or spurs on the legs, I prefer to follow the terminology proposed by Grimshaw (1905). (Osten-Sacken, 1881: 127, credits Mik, 1878 as proposing this terminology; I have not seen Mik's paper). Grimshaw suggested that each leg be regarded as extending in a straight line horizontally at right angles to the longitudinal axis of the body. The upper surface of the leg is termed dorsal, the lower ventral; the surface facing toward the front of the insect is termed anterior, that toward the rear, posterior. In life the mid and hind legs in chironomids are held more or less along the side of the abdomen, so the morphologically posterior surface is facing medially (Fig. 149). The two long spurs at the apex of the hind tibia have been termed medial and lateral, or inner and outer, as indeed they are when the insect's legs are in the rest position. Using Grimshaw's terminology, however, the lateral and medial tibial spurs are the antero-ventral and postero-ventral spurs, respectively. Similarly, the "medial comb" on the apex of the hind tibia would be called the posterior comb.

The **fore coxa** (Cx I) is deeply notched dorsally, and the dorsal coxal articulation, at the end of an extension of the pleural ridge, fits into this notch (Fig. 66). Postero-distally, just proximal to a projection articulating to the trochanter, Cx I bears three to six strong setae, while about 10 to 16 setae occur along the antero-distal border. Cx II is much longer and more slender than Cx I, and it tapers to a single pointed articulation dorsally (Fig. 66). One can see a weak **meron** partially separated from Cx II posteriorly (Fig. 66) and a small, triangular internal projection, probably a reduced coxal-trochantinal articulation, anteriorly. Just distal to this projection is a group of about 12 pale setae with prominent, clear bases. The distal end of Cx II is somewhat produced mesad. The antero-distal border bears about 16 setae. Cx III is shorter and broader than Cx II and is rounded dorsally. About eight pale setae occur at about 0.3 of its length on its anterior border, much as in Cx II. The antero-distal setae number about 10 to 12.

The **trochanters** are all fairly similar in shape. Each bears a weakly sclerotized area postero-proximally in which are found three to five clear campaniform sensilla. A long, pointed projection of the femur is fused to the distal 0.3 to 0.5 of the trochanter antero-ventrally. A few setae occur ventral to this fused projection; slightly more setae occur dorsal to it.

Three sensilla basiconica and a group of about six sensilla, apparently campaniform sensilla, occur antero-dorsally near the distal end of the trochanter.

The **femora,** like the trochanters, are quite similar. The surface is covered with coarse microtrichia arranged in groups of three to five. Setae are also present; they are most numerous dorsally and ventrally. At about 0.2-0.5 of the fore femur (Fe I) of most species with plumose antennae are about eight to fourteen setae which are conspicuously longer than those nearby, forming what could be called a weak **femoral beard.**

The **tibiae** are more slender than the femora; each bears setae and grouped microtrichia (Fig. 22), as with the femora. The fore tibia (Ti I) bears one ventral terminal spur (Figs. 105, 106), the mid tibia (Ti II) bears two subequal ventral terminal spurs, and the hind tibia (Ti III) bears two ventral terminal spurs, the antero-ventral one being about 0.7 times the length of the postero-ventral one (Figs. 21, 109). In species with plumose antennae, the spurs are long and slender and the basal 0.3 to 0.6 is sparsely to well covered with small, sharp projections or "prickles" (Sublette, 1967a). In some species with reduced male antennae the spurs, particularly on Ti II, are much shorter and stouter (cf. Figs. 105-107). Each tibial spur also has a sensillum (campaniform sensillum?) basally; the sensillum looks like a small, clear oval. In species with plumose antennae the distal half of Ti III bears a region of short, stout setae posteriorly (Figs. 21, 22, 109). These setae are fewer and are in a narrower band proximally but become more numerous and cover much of the posterior surface of the tibia near its distal end (Figs. 21, 109). They possibly aid in cleaning the legs and antennae. Posteriorly Ti III bears a "comb" of some 15 to 25 long, stout, spine-like setae (Figs. 21, 109). Just proximal to the postero-ventral spur on Ti III the integument is usually marked with a polygon pattern (Fig. 109); a similar pattern is sometimes present on Ti I.

The **tarsomeres** ("tarsal segments") bear setae and grouped microtrichia. Ventrally the first two or three tarsomeres bear from two to twenty-six **spiniform setae** (= *Stacheln,* Pagast, 1947; *Sohlenstachel,* Fittkau, 1962; *tarsal spines,* Saether, 1969; *soies spiniformes,* Serra-Tosio, 1971; *Starre Borsten,* Schlee, 1968) arranged more or less in pairs in two irregular rows (Fig. 108). The proximal three tarsomeres are basically cylindrical. The fourth tarsomere (Tm_4), however, is slightly expanded and more membranous disto-ventrally, and this expanded region is covered with numerous microtrichia. The dorso-lateral regions are constricted just before the apex, and the articulation of Tm_5 is in a definite dorso-distal indentation. The distinctive shape of Tm_4 has been termed "cordiform" (heartshaped), although the shape is certainly more complex than a simple heart. This cordiform condition may be less developed in species with reduced antennae. The dorso-lateral constrictions in particular may be less pronounced or even absent. Tm_5 is somewhat elliptical in cross-section, being somewhat flattened laterally.

The **posttarsus** (= *pretarsus,* de Meijere, 1901; Knight and Laffoon, 1970c: 177, discuss the use of post- rather than pretarsus) in *Diamesa* consists of the claws, empodium, possibly pulvilli, and unguitractor (Snodgrass, 1935: 198-200) (Fig. 23). Each of the two tarsal claws bears several seta-like spines basally and, in species with plumose male antennae, several apical teeth (Figs. 23, 24). In *D. nivicavernicola* the claws have an additional tooth dorsally (Fig. 25), while the claws in most species with reduced antennae lack the apical teeth. A long, fringed empodium emerges from between the two claws (Figs. 23, 25). Very small pulvilli seem to be present in some favorable slides of some species.

The legs in species of *Diamesa* with plumose male antennae are long and slender, and the fore leg ranges from 0.86 to 1.27 times as long as the body. The legs in species with reduced antennae are proportionally longer — in *D. leoniella,* for example, the fore leg is about 1.58 times the body length. The extreme is *D. nivicavernicola,* with a fore leg 1.71 times the body length. Mani (1972) notes that "the adults of nearly all eutorrenticole species have extraordinarily long legs that enable them, on emerging, to retain a firm hold on the submerged and securely anchored pupal case while the wings are spread out to dry in the air before take-off for flight." The larvae of species of *Diamesa* with reduced male antennae in the adult generally live in thin films of water on rocks in torrents, so it at least seems possible that the long-legged condition in these species could give the emerging adult enough time to momentarily stand above the water surface and expand the wings before flight.

The considerable thickening of the legs in the brachypterous form of *D. leona* is also noteworthy (cf. Figs. 102-104, 146-147).

Several ratios expressing the relative lengths of the leg segments have been used in chironomid systematics. These ratios are illustrated in Fig. 146.

Genitalia. — The correct homologies of the external genitalia in insects are, to say the least, still not clear. Saether (1971) has mentioned some of the interpretations and problems of terminology of the genitalia and has applied some of the recent ideas and terms of Smith (1969, 1970a, 1970b), plus adding some of his own terms, to the genitalia of chironomids; several of his suggestions are followed here.

The male *Diamesa* hypopygium consists of the modified tergite and sternite of the ninth segment, the paired ventrolateral appendages of the ninth segment, the median intromittant organ and the various sclerites associated with it, and the remains of the post-genitalic segments. The ninth segment differs markedly from the preceding ones. The ninth tergite is shortened and narrowed, and its lateral and anterior margins are often poorly delimited, while the ninth sternite is much shortened medially and is produced up and around the sides of the abdomen (Fig. 131). The ninth sternite bears setae dorsolaterally, and the ninth tergite bears setae laterally. Usually the ninth tergite possesses an **anal point** (Fig. 131). This may be a mere short projection of the posterior margin of the ninth tergite with no accompanying internal structures, as in *D. aberrata* (Fig. 112a). More often, however, the anal point is as long as or longer than the ninth tergite and is strengthened by internally-directed apodemes continuing from the base of the anal point antero-laterad on the underside of the ninth tergite, as in *D. bohemani* (Fig. 115). The anal point may bear a **terminal peg** at its tip or, rarely, within an apical cavity (Fig. 112a). In some species a dorsal "keel" is present on the distal region of the anal point (Fig. 115). The anal point is usually directed posteriorly, although in *D. leona* it is nearly vertical (directed ventrally) and is thus difficult to see in many slide preparations (Figs. 116, 117). Wensler and Remple (1962) consider the anal point to be the tenth tergite.

The **gonocoxite** (Smith, 1969) (= *basistyle, Basalglieder,* etc.) is essentially a cylinder opening proximo-dorsally into the body cavity (Fig. 126). Its large opening is here termed the **basal foramen.** The gonocoxite articulates loosely to the dorsolateral extensions of the ninth sternum, and the dorsal and lateral border of the basal foramen is strongly sclerotized and somewhat produced inward, forming the **coxapodeme** (Saether, 1971) (Fig. 126). While the simplest gonocoxite in *Diamesa,* as seen in *D. simplex* (Fig. 111), lacks any pronounced lobes or appendages, the gonocoxite in other species bears several structures. In many species the mesal border of the basal foramen is expanded mesad to form a flat **basal plate** (= *Basalanhange,* Pagast, 1947: Abb. 45, *b;* (?)*Dritte Spange,*[3] Schlee, 1968: 80, Abb. 32, 162-167) (Figs. 125, 126). The basal plate bears numerous short, stout microtrichia and sometimes setae ventrally (Figs. 27, 28). It is hidden in dorsal view by the ninth tergite but is visible ventrally. Posterior to the basal plate, on the medial or dorsomedial region of the gonocoxite, is usually found a poorly sclerotized field of setae

[3] Saether (1971: 1249, Figs. 7, 8, 9) interprets the "Dritte Spange" as the aedeagal lobe (see below). I believe, however, that Saether (1971: Figs. 7A, 8B) applies "aedeagal lobe" to two different structures.

and microtrichia. This is weakly developed in *D. aberrata* (Fig. 112a), for example, but is better defined in *D. incallida* (Fig. 110). In *D. spinacies, mendotae, ancysta,* and other species the distal end of this region is free from the gonocoxite (e.g., Figs. 27, 125, 130, 133). Pagast (1947: Abb. 45, a_1) calls this region the "oberer Coxitanhang;" its homologue in other insect groups is unclear, and I hesitate to apply Smith's terminology to it as Saether has done. I shall call it the neutral **medial field.** Species in the *latitarsis*-group (Serra-Tosio, 1967b), such as *D. lindrothi* (Fig. 137), have one or more finger-like, seta-bearing medial or dorso-medial projections on the gonocoxite.

Several species, such as *D. mendotae, nivoriunda,* and *ancysta,* have a prominent tuft of extremely strong, long setae arising on a mound usually located just ventral to the basal plate (Fig. 128); this group is here termed the **basimedial setal cluster.** *D. ancysta* has, in addition, a few strong setae on an ill-defined mound just ventral to the medial field (Fig. 125).

Setae occur over most of the gonocoxite, as do microtrichia; the latter are irregularly grouped in sets of three to six. A strong **basal wedge** (= *Penis* Pagast, 1947: Abb. 45, *p*) (Fig. 131) is usually found between the very bases of the gonocoxites. The antero-dorsal margin of the basal foramen projects slightly and fuses with a bridge-like sclerotized member which connects the two gonocoxites. Wensler and Remple (1962) interpret this bridge as the "transverse apodeme of the tenth sternite" (TAP), Schlee (1968) terms it the "Bogenspange," and Saether (1971) calls it the **sternapodeme.** The sternapodeme in *Diamesa* takes a variety of shapes. In *D. lindrothi* (Fig. 137) and others in the *latitarsis*-group (Serra-Tosio, 1967b) it is simply slightly arched. In other species, such as *D. mendotae,* it has projections antero-laterally (Fig. 130), while in species with much reduced antennae, such as *D. leona,* it is quite triangular (Fig. 116).

The **gonostylus** (Smith, 1969) (= style, dististyle, etc.) inserts in the membranous disto-dorsal region of the gonocoxite and normally folds forward (the exception is *D. nivicavernicola*), as is the case in the Orthocladiinae, Tanypodinae, and Podonominae. It normally bears a short, stout **subterminal peg** or spur (= *Griffe*). In *D. davisi* and *amplexivirilia,* several tooth-like serrations are also present on the distal end of the gonostylus (Figs. 119, 120).

Two largely membranous lobes lie between and above the gonocoxites. The more dorsal lobe extends posteriorly from the entire rear margin of the ninth tergite. From its location I would interpret it as the **proctiger** (Crampton, 1942: 86, Fig. 11B; van Emden and Hennig, 1970: 131) (Fig. 131), that is, the remnants of the tenth and eleventh abdominal segments. Saether (1969: 28) terms it the "caudal lobe of tergite IX." If an anal point is present, it lies dorsal to the proctiger. The proctiger is strictly membranous, bears numerous fine microtrichia, and may, in unfavorable slide mounts, be occasionally compressed and folded beneath the ninth tergite.

Immediately ventral to the proctiger, and usually hidden or somewhat obscured by it, is the intromittant organ. According to Smith (1969: Figs. 3D, 4B, D), the intromittant organ in pterygotes has been formed by the fusion of the gonapophyses (possibly endites) of gonocoxite IX. Simple dissection of alcohol material shows that the intromittant organ in *Diamesa* is a weak, membranous lobe bearing two dorsal sclerotized members which articulate anteriorly with the sternapodeme and converge posteriorly to nearly touch each other (Figs. 26, 126). According to van Emden and Hennig (1970) and others, these structures are the parameres, a usage followed by Brundin (1966). Reiss (1968) calls them the "obere Platte des Penisscheiden ("Paramere")," Schlee (1968) calls them the "Hakenspange," while Saether (1971) seems to call them the **aedeagal lobes.** They apparently are the dorsal rami in Smith's (1969) terminology. Each aedeagal lobe is produced into the cavity of the gonocoxite near the articulation of the aedeagal lobe to the sternapodeme, forming a strong apodeme, the **phallapodeme** (Saether, 1971) (Fig. 126). The aedeagal lobes often have poorly delimited borders, particularly posterolaterally, and are thus difficult to show in all drawings.

The main surface of the intromittant organ is a fine, clear membrane which is invisible in slide mounts but is fairly easily seen in dissections. Dorsally it extends from the antero-medial margin of the aedeagal lobes to the rear margin of the sternapodeme (Fig. 26). Laterally and ventrally it apparently runs from the postero-lateral margins of the aedeagal lobes to the medial margin of the proximal foramen of the gonocoxite and to the basal wedge.

Systematic Treatment

Genus DIAMESA

The genus *Diamesa* is keyed in Brundin (1956) and Serra-Tosio (1968). The following diagnosis is in part after Serra-Tosio (1971).

Diagnosis, adult ♂. — Antenna plumose, with 13 flagellomeres, or with varying reduction in plumosity and loss of flagellomeres to a non-plumose condition with 8 flagellomeres. AR usually less than 2, occasionally up to 2.8. Scape only rarely with setae, pedicel usually with 1-3 setae ventro-medially. Eyes not produced bridge-like dorsally, dorso-medial corner truncate or rounded, without or with only weak to moderate dorsal ocular apodeme; eyes hairy or bare. Postocular setae uniserial, outer vertical setae usually distinguishable from inner vertical setae, inner vertical setae usually fairly numerous, extending half or more of distance from dorso-medial margin of eye to midline of vertex; interocular setae usually distinguishable from inner vertical setae. Clypeal setae present. Palpus 5-segmented, with a distinct sunken organ on third palpal segment. Antepronotal sclerites with setae only laterally, usually with small medial notch. Scutum with dorso-central setae uniserial (occasionally staggered posteriorly), only exceptionally with a few acrostichal setae; prealar setae confined to a group on postero-dorsal region of prealar callus. Wings with microtrichia visible as minute points at about 100×, usually visible as seta-like projections at 600×; wings without setae on membrane; anal lobe usually slightly acute; setae present dorsally on R, R_1, and R_{4+5}; r-m slightly to moderately arched; apparent m-cu present; distance from apparent fCu to apparent m-cu less than length of apparent m-cu. Fourth tarsomere shorter than fifth, more or less cordiform; Ti III with a comb of spines in a fairly regular single row. Hypopygium usually with an anal point; gonocoxite with a slight to well-developed basal plate, often with a medial field; basal wedge present; intromittant organ with only dorsolateral regions sclerotized (forming the aedeagal lobes) and with moderate phallapodemes; gonostylus usually with subterminal peg.

Key to the Nearctic Species of Diamesa, Adult Males

1. Antenna plumose, with 13 flagellomeres (Fig. 36) 2

1′. Antenna not plumose, usually with 8 (1 species with 10-11) flagellomeres (Figs. 40, 41, 43) 25

2 (1). Eyes hairy, i.e., length of eye microtrichia about 1.5 or more times the height of ommatidial lenses and visible along lateral eye margin when head is viewed from front (Fig. 48) 3

2′. Eyes not hairy, i.e., eye microtrichia not visible or at least not surpassing height of ommatidial lenses along lateral eye margin when head is viewed from front (Fig. 51) 13

3 (2). Basimedial setal cluster present, usually located just ventrad to basal plate (Fig. 128), occasionally just distad to basal plate (Fig. 115) or just below medial field (Fig. 113) 4

3′. Basimedial setal cluster absent 12

4 (3). Basimedial setal cluster immediately below mid-region of medial field; gonostylus fairly slender, widest at about 0.3 its length; medial field with medial surface flat and vertical, giving appearance of strong medial border; distal 0.2 of medial field free; anal point short (Fig. 113) .... *D. heteropus*

4′. Basimedial setal cluster located more proximad, either ventrad or just ventro-distad to basal plate 5

5 (4′). Gonocoxite very long, slender, with basimedial setal cluster at end of or just distad to weak basal plate; setae in basimedial cluster about 12-15, directed slightly anteriad and not reaching much beyond mid-line of hypopygium; medial field elongated, with numerous long, anteriorly-directed setae on distal 0.4 (Fig. 115) .... *D. bohemani*

5′. Gonocoxite not unusually long and slender; basimedial setal cluster located below basal plate; medial field not elongate, without numerous anteriorly-directed setae 6

6 (5′). Gonostylus triangular, very broad distally, i.e., postero-distal region expanded and forming a corner (Fig. 129) .... *D. nivoriunda*

6′. Gonostylus not triangular 7

7 (6′). Gonostylus broadest at about 0.6 its length, somewhat recurved, with disto-dorsal ridge (Fig. 130) .... *D. mendotae*

7′. Gonostylus straighter, without disto-dorsal ridge 8

8 (7′). Basimedial setal cluster with 10 or fewer setae, cluster just below distal end of basal plate; medial field with wide, free distal end curving mesad slightly (Fig. 126) .... *D. chiobates*

8′. Basimedial setal cluster with over 15 setae, cluster below basal plate; medial field variable 9

9 (8′). Medial field expanded medially, distal 0.3-0.4 of medial field free and directed posteriad; gonostylus fairly broad (Fig. 131) .... *D. cheimatophila*

9′. Medial field not particularly broad and expanded, distal 0.2 free and curving mesad slightly; gonostylus more slender 10

10 . Basal plate inconspicuous or absent (Fig. 114) .... *D. haydaki*

10′. Basal plate fairly strong, with numerous short, stout microtrichia ventrally 11

11 (10′). Basal plate produced disto-medially; several fairly long, very strong setae on an ill-defined mound below medial field; gonostylus slender (Fig. 125); western species .... *D. ancysta*

11′. Basal plate not produced disto-medially; strong setae below medial field not on a particular mound; gonostylus stronger (Fig. 127); eastern species .... *D. vockerothi*

12 (3′). Gonostylus very long, about 0.7 times length of gonocoxite; medial field long, slender, with 1-3 long mesad-directed setae at about 0.5 its length and about 3 long setae at distal end; distal 0.4 of medial field free (Fig. 138) .... *D. insignipes*

12′. Gonostylus shorter; medial field expanded medially, with stout setae ventromedially (Fig. 123) .... *D. bertrami*

13 (2′). Gonostylus forked; anal point short, very broad (Fig. 124) .... *D. geminata*

13′. Gonostylus not forked; anal point slender or absent 14

14 (13′). Gonocoxite distally with very strong dorso-medial projection (Fig. 135) .... *D. sommermani*

14′. Gonocoxite without distal projection 15

15 (14′). Gonocoxite with a small, dorso-medial, setous, finger-like projection and a stronger, medial spine- and seta-bearing projection just distad to basal foramen (Fig. 137); small species (L_{tot} 3.0-3.7) .... *D. lindrothi*

15′. Gonocoxite without such projections; size larger 16

16 (15′). Anal point absent; Tg IX very weak medially, appearing to be formed of two separate sclerites (Fig. 110) .... *D. incallida*

16′. Anal point present; Tg IX only slightly (*D. simplex, aberrata*) or not at all weakened medially 17

17 (16′). Medial field with basal 0.7 expanded mesad, with distal 0.2 free and tapering posteriorly; aedeagal lobes with fringe of fine setae (microtrichia?) along distolateral border (Fig. 123) .... *D. chorea*

17′. Medial field without medially-expanded basal region; aedeagal lobes without fringe disto-laterally 18

18 (17′). Medial field at most only weakly differentiated, without sharply delimited dorsal border; distal end of medial field may be expanded mesad slightly, but not free and not extending posteriad; without or with only weak apodemes on underside of Tg IX 19

18′. Medial field well developed, with sharply delimited dorsal border; distal end of medial field free, extending posteriad or postero-mesad 20

19 (18). Medial field only very weakly differentiated, without sharp dorsal margin and without expanded distal end; gonostylus (when properly oriented) fairly sharply narrowed basally; anal point moderate, not quite or just reaching distal ends of aedeagal lobes (Fig. 111) .... *D. simplex*

19′. Medial field slightly better developed, with slightly expanded distal end; gonostylus fairly slender, straight, of nearly equal width throughout; anal point short to moderate, shorter than length of Tg IX (Fig. 112) .... *D. aberrata*

20 (18′). Disto-dorsal end of medial field well-sclerotized, flap-like, projecting dorso-mesad; gonostylus fairly slender, somewhat recurved, of fairly equal length throughout (Fig. 139) .... *D. gregsoni*

20′. Medial field without well-sclerotized, disto-dorsal, flap-like projection; gonostylus usually distinctly broadened basally 21

21 (20′). Apical 0.3 of gonostylus sharply narrowed, tapering (Fig. 132) .... *D. garretti*

21′. Gonostylus otherwise 22

22 (21′). Gonostylus "clubbed," i.e., distal 0.5 expanded (Fig. 121) .... *D. clavata*

22′. Gonostylus not enlarged distally 23

23 (22′). Apical 0.2 of medial field free, directed posteriad, with numerous microtrichia and with setae directed slightly antero-mesad; proximo-dorsal region of medial field without microtrichia; about 8 fairly long setae at proximo-dorsal corner of medial field; gonostylus tapering fairly evenly (Fig. 122) .... *D. colenae*

23′. Apical 0.2 of medial field free, directed postero-mesad; proximo-dorsal region of medial field with microtrichia; setae and microtrichia distributed evenly over medial field; gonostylus broadest basally 24

24 (23′). Gonostylus long, with apical 0.5-0.6 slender (Fig. 134) .... *D. arctica*

24′. Gonostylus shorter, with apical 0.4-0.5 slightly tapering distally (Fig. 133) .... *D. spinacies*

25 (1′). Antenna with 10-11 flagellomeres (Fig. 40); legs extremely long, $L_{p_I}:L_{tot}$ about 1.7; gonostylus directed posteriad or postero-mesad, not folded forward; gonostylus disto-dorsally with flat, microtrichia-covered field (Fig. 136) .... *D. nivicavernicola*

25′. Antenna with 8 flagellomeres (Figs. 41, 43); legs shorter, $L_{p_I}:L_{tot}$ about 1.5; gonostylus not as above 26

26 (25′). Medial field with distal 0.2 free; gonostylus broadest basally, distal 0.5 narrowed; anal point fairly long, directed posteriad (Fig. 140) .... *D. coquilletti*

26′. Medial field weak, without free distal end; gonostylus and anal point usually otherwise 27

27 (26′). Gonostylus with 3 or more apical tooth-like serrations; medial surface of gonostylus without "pile" of microtrichia 28

27′. Gonostylus without apical teeth; medial surface of gonostylus with "pile" of microtrichia 29

28 (27). St IX with very long postero-dorsal extensions projecting along gonocoxite; gonostylus broad basally, sharply narrowed at about 0.5 its length, with fairly broad distal end (Fig. 119) .... *D. amplexivirilia*

28′(27′). St IX with short postero-dorsal extensions; gonostylus broad basally, tapering fairly evenly towards apex (Fig. 120) .... *D. davisi*

29 (27′). Anal point short, weak, directed ventrad (Figs. 116, 117); large species (L_{tot} 3.9-5.3 mm) .... *D. leona*

29′. Anal point fairly strong, broad basally, well sclerotized, directed posteriad (Fig. 118); smaller species (L_{tot} 3.1-4.1) .... *D. leoniella*

Synonymies and Descriptions

Long synonymies, attempting to cite every occurrence of a name in the world literature, seem unnecessary, and synonymies here are not meant to include every published reference to a specific name. Omitted are entries in lists of species compiled from the literature, references in which the author had no specimens but included a name in a key or discussion using characters from the literature, and entries in catalogues (unless the name is a new combination or new name or new locality records are given).

The following descriptions are fairly long. Actually, I don't feel that all chironomid descriptions should be this detailed. On the other hand, many descriptions have been based on superficial characters and are too incomplete to permit an accurate identification. Furthermore, many characters important in a phylogenetic classification have been overlooked. Except for coloration, I have simply described these species of *Diamesa* as thoroughly as I can, without trying to omit "unimportant" characters. I feel that when we have looked at more characters in the entire family we will be able to better form a sound phylogenetic classification.

In reading these descriptions, one must note the phrase "as in *D. mendotae* [or *amplexivirilia,* etc.] except:". This means that everything in the description of *mendotae* (or *amplexivirilia*, etc.) also applies to the description of species "A", except as stated in the description of species "A". For example, the description of the antenna of *D. ancysta* says nothing of the number of flagellomeres or whether the antenna is plumose or not. Reading the description of *D. mendotae,* however, we see "Figs. 36, 37, 39. 13 flagellomeres, plumose;". The antenna of *ancysta,* therefore, has 13 flagellomeres and is plumose, as in Figs. 36, 37, and 39. The next phrase, "longest flagellar setae . . .", in the description of *mendotae,* is the first phrase in the antennal description of *ancysta,* indicating that the longest flagellar setae in *ancysta* are slightly different from those in *mendotae.* One simply reads each phrase between semicolons in the description of *mendotae.* If the phrase is not in the description of species "A", then the character in species "A" is essentially as described in *D. mendotae.* This merely avoids repeating "13 flagellomeres, plumose" and numerous other phrases some 20 or more times.

Unless stated otherwise in the descriptions, all measurements are in microns. The first figure given is the mean; the pair of numbers in parentheses is the range.

Diamesa aberrata Lundbeck

D. Waltlii Meigen. Staeger, 1845: 353-354 (recorded from Greenland; misdetermination).

D. aberrata Lundbeck, 1898: 289-291 (described from 4 males from Greenland); Edwards, 1923: 235, 237-238 (records female, pupa, and damaged male from Jan Mayen Island; determination somewhat questionable); Edwards, 1933: 616, 618 (figures hypopygium of co-type); Edwards, 1935: 471 (in part) (records from Jameson Land, East Greenland); Pagast, 1947: 471-472, 520-521 (description of adult and pupa); Wuelker, 1959: 345-348 (adult description, figure of hypopygium, comparison of pupa with that of *D. incallida* (Walker), description of larva); Oliver, 1962: 4-5 (designation of lectotype; description, figure of hypopygium); Serra-Tosio, 1964: 32-34 (discussion of pupal characters; records of adults in France); Serra-Tosio, 1966: 127 (records from "le Massif Central (Vivarais)," France); Serra-Tosio, 1967d: 98, 101 (predation on larvae by Simuliidae); Saether, 1968: 455 (records 9 males from Finse area, Norway); Serra-Tosio, 1969a: 205-206 (records specimens from Brundin collection from Norway and Sweden); Serra-Tosio, 1970d: 121 (records female pupa from France); Serra-Tosio, 1970c: 25 (records 4 pupal exuviae, 2 males from southern Spain); Serra-Tosio, 1971: 129-137, Figs. 43-47 (description of male and female adults, pupa; distribution; ecology).

[*non*] *D. aberrata* Lundbeck. Andersen, 1937: 80-82 (misdetermination of *D. simplex* Kieffer).

Description (unless otherwise stated, n = 5 and measurements are in microns): as in *D. mendotae* except:

TOTAL LENGTH. — 5.3 (4.9-6.1) mm.

COLORATION. — not noted before slide mounting.

ANTENNA (n = 4). — longest flagellar seta 0.56 (0.49-0.70) L_{fl}; Flm_{13} with apical 0.19-0.24 spindle-shaped, mainly swollen ventrally; 1-2 short, slender setae dorso- and ventro-medially on Flm_1; long (MaxL 594-859) flagellar setae 0-1 on Flm_1, 2-3 on Flm_2, 5-8 on Flm_3, increasing to about 13 on Flm_{12}, numerous on Flm_{13}; 1 or occasionally 2 smaller, blunt sensilla basiconica ventrally on Flm_1, 1 ventrally on $Flm_{2\,\&\,3}$; 1 or occasionally 2 ringed sensilla coeloconica dorsally, 1 ventrally on Flm_1, 1 dorsally on Flm_2; $\overline{L}_{flm_{1-13}}:\overline{W}_{flm_{1-13}}$ 101:54, 23:48, 28:46, 29:43, 31:43, 32:44, 36:44, 38:44, 42:43, 43:41, 44:39, 45:39, 779:37; AR 1.45 (1.30-1.72) (n = 5); 1 preapical antennal seta; L_{pas} 37 (27-49); D_{pd} 180 (166-198); 2 (rarely 3) pedicellar setae ventro-medially; H_{sc} 192 (174-212).

HEAD. — W_h 659 (604-707); dorsal ocular apodeme weak to moderate; IOS/side 3-4; 1-2 medial vertex setae occasionally present; PtOS/side 10-13; inner verticals reaching to 0.53-0.69 of distance from dorso-medial margin of eye to midline of vertex. Clypeus slightly swollen anteriorly, as long as or longer than wide. Eyes not hairy, microtrichia visible as minute points antero-medially, not visible laterally; H_e 301 (284-322). $\overline{L}_{ps_{2\text{-}5}}:\overline{W}_{ps_{2\text{-}5}}:\overline{MaxL}_{pss_{2\text{-}5}}$ 103:38:88, 177:42:67, 157:35:63, 255:31:32. D_{so} 15 (14-16); CP 0.94 (0.90-0.98); palpal stoutness 4.81 (4.48-5.34).

THORAX. — L_{th} 1.29 (1.02-1.44) mm, D_{th} 1.30 (1.16-1.41) mm. Antepronotum with medial commissure strong, not quite reaching rear margin of phragma I, reaching to or slightly surpassing scutal process; antepronotal notch weak, acute to slightly obtuse, medial corners rounded; LAS/side 7 (5-11); dorsocentrals uniserial to staggered posteriorly; DCS/side 10 (7-17), $MaxL_{dcs}$ 142-166 (n = 3); PAS/side 9 (6-11); scutellar setae roughly in 2 irregular rows; ScS about 18-22, $MaxL_{scs}$ 139 (105-176); ASR 0.63 (0.62-0.65); 1-3 fine setae on epimeral II protuberance.

WING. — L_w 3.5 (3.2-3.7) mm, W_w 1.08 (1.02-1.19) mm. Dry wing not available. Slide mounted wing showing: costal projection 94 (79-129) (n = 4) or 5.5 (4.0-7.2) times its width; base of r-m distal to apparent m-cu by 2-4 times width of r-m; apparent m-cu distal to apparent fCu by 2-6 times width of apparent m-cu; VR 0.90 (0.86-0.92). Remigium with 1 strong seta on hand, 0(?)-2 weak setae and about 8-15 campaniform sensilla just beyond wrist, and 2-4 setae and 4 large and about 10 smaller campaniform sensilla on distal 0.5 of forearm. Setae 17 (14-19) on R, 12 (9-14) on R_1, 3 (2-4) on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 3 or 4 ventrally on Sc just distad to arculus, 2 dorsally on R_1, 1 dorsally and 1 ventrally (or rarely 1 dorsally with 1 ventral seta) near base of R_{2+3}, and 1 or 2 dorsally on R_{4+5}. Squama with 29-47 (n = 4) strong setae, $MaxL_{sqs}$ 119-202 (n = 4).

	Fe	Ti	Tm_1	$Tm_{2\text{-}5}$	LR	BV	SV
P_I	1440 (1260–1610)	1680 (1510–1860)	1200 (1060–1380)	1230 (1140–1340)	0.72 (0.70–0.74)	3.51 (3.35–3.68)	2.47 (2.01–2.62)
P_{II}	1630 (1430–1790)	1600 (1460–1700)	840 (790–900)	970 (910–1060)	0.53 (0.47–0.57)	4.22 (3.95–4.84)	3.85 (3.49–4.33)
P_{III}	1820 (1610–2030)	1910 (1700–2060)	1320 (1160–1460)	1210 (1140–1340)	0.69 (0.66–0.71)	4.02 (3.91–4.29)	2.84 (2.75–3.02)

LEGS. — $\overline{L_p:L_{tot}}_{I}$ 1.05. Fe I usually with sparse postero-dorsal beard of about 4-7 long setae. Apical spur of Ti I long, slender, with small, sparse prickles on basal 0.3-0.5; L_{tispI} 89 (85-98); apical spurs of Ti II stouter, subequal to nearly equal in length, with numerous prickles on basal 0.5; L_{tispII} 64 (56-73); $L_{atispIII}$ 67 (56-78), $L_{ptispIII}$ 94 (81-105). Weak polygon pattern occasionally visible near apex of Ti I.

Ti III with posterior comb of about 15-18 spines arranged in a fairly regular single row. Spiniform setae on first 3 tarsomeres of P I-III as follows: 2 (apical), 2 (apical), 0; 6-13, 2 (apical)-3, 0-1 (apical); 10-13, 4-7, 0. Lengths and ratios of leg segments, p. 51.

Hypopygium (without reference to *D. mendotae*). — Fig. 112. Tg IX with 12 (8-20) setae/side. Anal point short, shorter than Tg IX, rarely with apical peg; apodemes not present on underside of Tg IX. L_{gncx} 283 (276-290), $\overline{L}_{tot}$:$\overline{L}_{gncx}$ 19. Basal plate scarcely developed, margin obtuse to about right-angled disto-medially, with microtrichia ventrally. Medial field weakly to fairly well delimited dorsally, weakly sclerotized, with numerous microtrichia and setae, setae particularly strong antero-ventrally; distal end of medial field not or only very slightly free. Gonostylus slender, roughly of equal width, with subterminal peg and short terminal ridge. Sternapodeme a simple, slender arch. Basal wedge short but well developed, slightly rugose.

Diagnosis. — Antenna plumose, eyes not hairy; anal point present but short; gonostylus slender. *D. incallida* lacks an anal point, has a broader gonostylus, and has a more sharply delimited medial field. *D. simplex* has a longer anal point and its gonostylus is broader distally and narrows sharply proximally.

Material examined. — *Alaska*, Kenai Pen., 17 June 1965, Jeep trap 65-2, 9:10-10:50 PM, Primrose Seward and back, K. M. Sommerman, 1 male (USNM); *Alaska*, Palmer, 23 Sept. 1964, K. M. Sommerman, Jeep trap, 12 males (USNM); *Greenland*, "Godthaab, Möller, Type", 1 male (Copenhagen); "Grönland, M[?]us. [??]og. ♂" (handwritten label partially indecipherable), 1 male (Copenhagen); *East Greenland*, Cape Dalton, 20-viii-1933, D. Lack and G. C. Bertram, 1 male (BM(NH)); *East Greenland*, Jameson Land, 4-14. viii.1933, D. Lack. BM. 1934-233, 1 male (BM (NH)); *Iceland*, 2.5 km. W. Grimssatadir, 4.vii.1962, B. V. Peterson, E. Bond, Det. 225, L. F. 28.1.1963 DRO. 9.9-3, 1 male (CNC); *Jan Mayen Isle*, O. U. Jan Mayen Isle expedition. 8.viii.1947, living rooms; coll. A. Mac Fayden 63.1947, 1 male (BM(NH)); *Wyoming*, 44°10'N, 107°05'W, Powder River Pass, 18 mi. W, 13 mi. S of Buffalo, alt. 9,600', sweeping in spruce-fir forest 26 Aug. 1967, 27 Aug. 1968, leg. D. Hansen, 3 males (UMn).

Discussion. — Lundbeck (1898: 289-291) described *aberrata* from four specimens: "Godthaab two examples (Møller), two examples from older times without a specific locality" (translated). Lundbeck (l.c.) also states that Staeger (1845) had recorded *aberrata* from Greenland as *D. Waltlii*. Dr. S. L. Tuxen kindly loaned me the lectotype designated by Oliver (1962) and a specimen from Greenland apparently seen by Staeger and presumably recorded by him as *Waltlii*. I cleared the hypopygium of this latter specimen and confirmed that it was, indeed, *aberrata*, as Lundbeck (1898) stated. Lundbeck's description was too incomplete to permit a specific determination, and the species was unidentifiable until Edwards (1933) figured the hypopygium of one of Lundbeck's specimens and noted other characters. Two years later, Edwards (1935) recorded four specimens of *aberrata* from Jameson Land, East Greenland. A. M. Hutson at the British Museum (Natural History) kindly loaned me these four specimens, and I was surprised to find that the series consisted of three species: one specimen was *aberrata,* one was *chorea,* and two were *simplex.*

Andersen's (1937) hypopygial figure shows that he was actually seeing *D. simplex* (compare Andersen, 1937: Fig. 56 and my Fig. 111a).

Serra-Tosio (1971: Pl. 45, Figs. 6-20) notes the extreme variation in the length of the anal point in specimens from Europe. While I have fewer specimens than Serra-Tosio examined, I do find a similar variation in anal point length in nearctic material.

The few specimens I collected in Wyoming show no particular differences from those from Alaska, Greenland, or Iceland.

LOCATION OF TYPES. — Lectotype (and the other three specimens of of the series?) at the Zoologiske Museum, Copenhagen.

Diamesa amplexivirilia [4] new species

Description (unless otherwise stated, n = 5 and measurements are in microns):

TOTAL LENGTH. — 3.5 (3.3-3.7) mm (n = 4).

COLORATION (pinned specimens). — flagellum gray-brown, pedicel and basal 0.5 of Flm_1 light brown; head and thorax gray, pruinose; lateral scutal stripes dark gray; trochanters, proximal 0.05 of femora yellow-brown, rest of legs brown; shaft and capitellum of haltere pale, base becoming light brown; abdomen and hypopygium dark brownish gray.

ANTENNA. — Figs. 43, 45. 8 flagellomeres, rarely with partial fusion of $Flm_{7\ \&\ 8}$ or $Flm_{1\ \&\ 2}$; non-plumose, longest flagellar seta (on $Flm_{7\ or\ 8}$) 0.19 (0.17-0.21)L_{fl}; Flm_1 with basal 0.2 tapering proximally, without distinct basal nipple, rest roughly cylindrical, often slightly constricted at midregion or just slightly swollen distally; Flm_{2-5} irregularly fusiform, Flm_{6-7} distinctly fusiform; Flm_8 roughly cylindrical or slightly fusiform in basal 0.4-0.6, tapering beyond to blunt apex; flagellar setae short (MaxL 76-93), setae 2-6 on Flm_1, 2-3 on Flm_2, 1-4 on Flm_3, 0 or occasionally 1 on $Flm_{4\ \&\ 5}$, 0-2 on Flm_6, 2-6 on Flm_7, 2-3 on Flm_8; setae basically in single irregular whorl/flagellomere; setal whorl at 0.6-0.8 of Flm_1, near 0.5 of Flm_{2-7}, at 0.1 of Flm_8; antennal furrow absent; all Flm's with long microtrichia. Antennal sensilla as follows: large, blunt sensillum basiconicum 1 on Flm_{1-5}; slightly smaller, blunt sensilla basiconica 0-1 on Flm_1, 2-4 on Flm_2, 2-6 on Flm_3, 4-6 on Flm_4, 2-5 on Flm_5, 3-6 on Flm_6, 1-6 on Flm_7, 0 on Flm_8; long, pointed sensilla basiconica 1-4 on Flm_6, 8-11 on Flm_7, numerous on Flm_8; ringed sensilla coeloconica 1-2 on Flm_1, 1 on Flm_2, 4-7 on Flm_8; small sensilla coeloconica 1-2 on Flm_1, 1 on Flm_{2-3}, 1-3 near apex of Flm_8. $\overline{L}_{flm_{1-8}} : \overline{W}_{flm_{1-8}}$ 104:35, 45:33, 40:31, 28:29, 27:31, 24:32, 34:40, 125:45; AR 0.38

[4] From *amplector, -exus* (L.), enfold or embrace, and *virilia* (L.), male genitalia (Brown, 1954). The name refers to the posterior extensions of the ninth sternite, which extend along the sides of the hypopygium and appear something like hands holding or embracing it (Fig. 119).

(0.31-0.46); 2 apically curved preapical antennal setae; L_{pas} 26 (24-29); pedicel roughly globose, with microtrichia; D_{pd} 68 (63-76); 1-3 pedicellar setae; 1 campaniform sensillum dorsally at ridge of indentation for Flm_1; scape quite small, with distinct articulation to pedicel ventro-medially and weak articulation to antennifer ventro-laterally; H_{sc} 63 (59-69); scape with microtrichia but without setae; scape well sclerotized all around.

HEAD. — Fig. 53. W_h 445 (435-464); coronal suture strong, ending between tops of antennal sockets and lower ends of vertex projections over scapes, bifurcating on dorsal region of vertex, with strong internal apodeme; coronal triangle short, barely visible anteriorly; vertex not sunken at arms of coronal suture; coronal triangle with usual 4 short setae in large sockets; rear margin of vertex produced dorsad at midline to form small, clear, triangular nape; vertex medially produced toward and broadly fusing with frons, forming broad, fairly well sclerotized region between antennal scapes; vertex fairly strongly projecting over dorso-medial region of each scape; reduced ocelli very far apart, about at level of tops of antennal sockets; dorsal ocular apodeme absent; interantennal bar absent; frons poorly or not at all delimited from antennal sockets; epistomal suture strong to moderate medially, strong to absent laterally; interocular setae usually distinguishable from inner vertical setae, but occasionally merging with them, in dispersed group centered 0.5-0.7 of distance from dorso-medial margin of eye to midline of vertex; IOS/side 6 (2-9); postocular setae in uniserial row running just behind rear margin of eye from near postero-ventral eye margin to merge with slightly longer, stronger outer verticals; PtOS/side 4-8; inner and outer verticals not well differentiated, the more medial inner verticals becoming more curved and decumbent, dispersed on dorsal region of vertex and just dorsomesad to dorso-medial corner of eye; inner verticals not or only occasionally occurring below dorsal margin of eye anteriorly, reaching to 0.53 (0.40-0.69) of distance from dorso-medial margin of eye to midline of vertex; medial vertex setae absent; slight vertex hump occasionally present behind eyes. Clypeus distinctly wider than long, sides converging ventrally, rounded, ventral margin rounded; clypeal setae in 2 dorso-lateral groups; CS 5 (2-9). Tentorium not or only very slightly swollen antero-laterally at base, but with moderate postero-medial basal plate-like projection; tentorium not extending beyond PTP. Eyes reniform; eyes strongly hairy, microtrichia about twice the height of ommatidial lens; eyes with dorso-medial margin broadly rounded; dorso-medial margin not extending as far mesad as ventro-medial margin; H_e 213 (208-218); ventral ocular apodeme very weak; antero-ventral margin of eye contacting tentorium; antennifer weak. Palpus 5-segmented; PS_1 without setae, roughly subglobose, nearly or as well sclerotized as other palpal segments; PS_2 broadest distally, PS_3 distinctly fusiform, PS_4 cylindrical or slightly fusiform, PS_5 approximately cylindrical; $\overline{L}_{ps_{2\text{-}5}}:\overline{W}_{ps_{2\text{-}5}}:\overline{MaxL}_{pss_{2\text{-}5}}$ 64:38:52, 111:46:49, 92:38:36, 141:28:25; sunken organ roughly hemispherical, prominent, at 0.7 of PS_3; D_{so} 18 (16-20); all palpal segments with grouped microtrichia; CP 1:08 (1.00-1.16); palpal stoutness 2.70 (2.47-2.89). Cibarial plate about as high as or slightly higher than wide, sides slightly concave, cornua fairly long, slender, slightly arched.

THORAX. — similar to *D. leoniella*, Fig. 86. L_{th} 1.07 (1.04-1.11) mm (n = 4), D_{th} 0.96 (0.94-1.00) mm (n = 4). All thoracic sclerites covered with fine microtrichia. Antepronotum with short but fairly strong medial commissure which extends only about 0.4 of distance to rear margin of phragma I and is slightly surpassed by anterior margin of scutum; antepronotal notch small, acute; medial corners rounded, scarcely or not surpassing anterior margin of scutum; anterior margin of antepronotal halves nearly straight or slightly arched medially, giving the antepronotum something of a truncate appearance, anterior margin arching back and then becoming concave antero-laterally; lateral antepronotal setae somewhat dispersed medially, roughly on ventro-lateral and antero-lateral margin, region of lateral setae strongly swollen; LAS/side 7 (4-11). Postpronotum fused with scutum antero-dorsally and with anteanepisternum II ventrally, delimited from scutum postero-dorsally; postpronotum without setae, but with 2-3 faint to clear postpronotal sensilla (?) antero-dorsally; postpronotal apophyseal pit small to nearly absent, postpronotal apophyses absent. Scutum in side view somewhat flattened, not or only slightly indented above parapsidal suture, extending as far as or surpassing fore margin of antepronotum; scutal process absent. Dorsocentral setae uniserial or just slightly staggered; a few tiny, clear dots (sensilla?) present in or just beside DCS row; DCS/side 9 (7-10), $MaxL_{dcs}$ 95-120; acrostichals absent. Prealar setae in elongate group or, if few, in staggered row, confined to postero-dorsal region of prealar callus; PAS/side 5 (3-8); supraalar setae absent; scutal angle moderate, rounded; parapsidal suture arched, with internal apodeme; humeral scar a tuberose oval just anterior to dorsal 0.3 of parapsidal suture; medial scutal scar running as a faint, narrow band from the anterior-most point of scutum to about the midpoint of scutum, there expanding to form broader, pale scar which narrows and disappears at about the ends of dorsocentral setae rows. Scutellar setae dispersed or very roughly in 3-4 rows; ScS 33 (23-48) (n = 4), $MaxL_{scs}$ 99 (81-115). Medial cleft of postnotum reaching about 0.3 of length of postnotum; postnotum with suture on midline posteriorly and with rounded postero-dorsal margin. Anteanepisternal pit small, ventral border less well defined than dorsal border; medioanepisternum II ranging from completely delimited ventrally, with round ventral margin, to partially fusing with postanepisternum II and with more pointed ventral margin; anapleural suture strong; ASR 0.52 (0.49-0.54); 0-8 setae on epimeral II protuberance, which is fairly well developed; 0-1 seta on epimeron II just below protuberance; no other setae on any other pleural sclerite.

WING. — L_w 2.76 (2.57-2.97) mm, W_w 0.98 (0.93-1.07) mm. Outline as in Fig. 99. Wing margin usually slightly concave at about 0.7 of R_1 and just before M_{3+4}, straight or slightly concave distal to anal lobe; anal lobe slightly obtuse. Dry wing showing: wing folds about as in *D. mendotae,* except that vestige of $?M_3$ weak and not running to wing margin and little or no fold present between M_{3+4} and Cu_1. Slide mounted wing showing: microtrichia visible as numerous, close points at 150×, seta-like projections not clearly discernable even at 650× except on or very near veins where wing surface is nearly vertical. Membrane without setae. Marginal setal fringe in 2 rows along proximal 0.2 of C, becoming more or less in 3 rows on distal 0.8 of C, then becoming alternating long-short past distal end of costa, longest on anal lobe. Costa becoming easily discernable just before humeral cross vein, distal 0.8 slightly wider than proximal 0.2, widest along distal 0.6 of R_1; costa ending moderately before tip of wing, at or slightly before level of end of M_{1+2}; costal projection 44 (24-63) or 1.9 (1.0-2.8) times its width; Sc appearing as sharp fold proximally, becoming very weak at or well before forking of R, ending before C. Distal 0.6 of R_1 closely appressed and somewhat diffusely fusing with C, usually slightly enlarged. R_{2+3} fairly strong only at base, fading beyond about 0.2-0.4 its length, scarcely visible distally; R_{2+3} running at first somewhat closer to R_{4+5} than to R_1, ending just beyond end of R_1; R_{4+5} strong, ending slightly before end of M_{1+2}. r-m strong, slightly arched; base of r-m anywhere from directly over apparent m-cu to distal to apparent m-cu by width of r-m. M a mere trachea proximally, gradually becoming stronger towards apparent m-cu; M_{1+2} fairly weak; vestige of ?R_5 easily visible as diffuse band just anterior to distal 0.3 of M_{1+2}; vestige of ?M_2 easily visible as diffuse band just posterior to distal 0.6 of M_{1+2}; apparent m-cu little more than a trachea, approximately perpendicular to M and Cu; apparent m-cu ranging from proximal to apparent fCu by width of apparent m-cu to distal to apparent fCu by 2 times width of apparent m-cu; VR 0.95 (0.92-0.98); M_{3+4} fairly strong; Cu strong, with prominent trachea visible to apparent m-cu; distal 0.5 of Cu_1 curving gently posteriorly. An fairly weak, fading before wing margin. Remigium with 1 strong seta on hand, 0-2 weak setae and about 8-12 campaniform sensilla just beyond wrist, and 2-4 setae and about 3 large and 6-8 smaller campaniform sensilla on distal 0.5 of forearm. Setae 8 (6-9) on R, 9 (8-11) on R_1, and 5 (2-9) on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 1-2 ventrally on Sc just beyond arculus, 2-4 dorsally on R_1, 1 (occasionally 0) dorsally near base of R_{2+3}, and 2-3 dorsally on R_{4+5}. Squama with 21 (15-27) setae, $MaxL_{sqs}$ 90 (75-95); alula bare.

LEGS. — Legs very long, slender; $\overline{L}_{p_I}:\overline{L}_{tot}$ 1.58; Fe I without beard, longest seta on any femur shorter than width of that segment. Apical spur of Ti I rather short, slightly expanded basally, with somewhat sparse prickles on basal 0.4-0.5; L_{tispI} 41 (36-48); apical spurs of Ti II slightly stouter, subequal in length, with fairly numerous prickles on basal 0.6-0.7; L_{tispII} 36-48; apical spurs of Ti III with numerous prickles on basal 0.5-0.7; $L_{atispIII}$ 40-50, $L_{ptispIII}$ 69-76; all apical tibial spurs with oval mark (sensory pit or dome?) on basal 0.2-0.4. Weak polygon pattern not visible near apex of Ti I; polygon pattern on Ti III very well developed and extensive. Ti III with posterior comb of about 17-20 spines arranged in a fairly regular single row. Posterior surface of Ti III with setae but without stout spines. Spiniform setae on first 3 tarsomeres of P I-III as follows: 2 (apical), 2 (apical), 2 (apical); 9-13, 3-5, 3; 15-24, 7-13, 3-5. Tm_4 about as in *D. mendotae*. Claws tapering to fairly sharp apex, without apical teeth; 3-5 long, slender spines arising from base of claws, some reaching apex of claw. Empodium long, curving up between claws, with numerous long, slender, curved spines. Minute spinous puvelli possibly present near base of claws. Lengths and ratios of leg segments as follows:

	Fe	Ti	Tm_1	Tm_{2-5}	LR	BV	SV
P_I	1740 (1560–1890)	1630 (1460–1740)	1060 (960–1120)	1100 (1180–1040)	0.65 (0.63–0.66)	4.01 (3.82–4.18)	3.20 (3.16–3.24)
P_{II}	1810 (1660–1990)	1540 (1430–1630)	760 (680–810)	850 (780–910)	0.49 (0.48–0.51)	4.86 (4.71–5.03)	4.41 (4.27–4.55)
P_{III}	1880 (1680–2030)	1700 (1600–1810)	1140 (1030–1240)	1230 (1140–1340)	0.67 (0.64–0.71)	3.84 (3.76–4.00)	3.15 (3.05–3.23)

HYPOPYGIUM. — Fig. 119. Tg IX with 4-13 setae/side; St IX with dorso-lateral region greatly produced along side of gonocoxite, projection reaching to or slightly beyond 0.5 of length of gonocoxite; projection with fairly numerous, short setae. Anal point slender, short, directed somewhat to nearly ventrad; apodemes not present on underside of Tg IX. L_{gncx} 336 (328-351), $L_{tot}:L_{gncx}$ 10. Basal plate fairly well developed, slightly produced disto-medially, with numerous microtrichia ventrally. Medial field scarcely developed. Gonostylus broadest in basal 0.4, then abruptly narrowing; gonostylus with subterminal peg and about 3 terminal teeth. Sternapodeme strongly produced antero-medially, fore margin truncate medially. Basal wedge small, rugose laterally.

DIAGNOSIS. — St IX strongly produced along gonocoxites, gonostylus abruptly narrowed and with apical teeth. *D. davisi* is the closest species but is easily separable with the above hypopygial characters.

MATERIAL EXAMINED. — *Alberta,* west end of shallow lake, Banff National Park, coll. ?, 3.VII.1957, 12 males (CNC); *British Columbia,* Yoho Val., 30 July 1935, A. L. Melander, 1 male (USNM); *Montana,* Glacier National Park, Renold's Creek at Going to the Sun Highway, alt. 5,800′, 24 July 1968, leg. Ron Hellenthall; on rocks, water 6°C., 7 males (UMn); *Washington.* Mt. Rainier, Glacier Station, 15 Aug. 1917, A. L. Melander, 1 male (USNM); *Washington,* Mt. Rainier, Paradise Park, August, 1917, A. L. Melander, 2 males (USNM); *Washington,* 3 mi. E., 6 mi. S. of Glacier, on rocks in meltwater stream, at timberline on Mt. Baker, 7 Sept. 1967, leg. D. Hansen, 18 males (UMn).

DISCUSSION. — This species is obviously closely related to *D. davisi* (cf. Figs. 119, 120). The gonostylus and long extension of the ninth sternite are quite different from *davisi,* however. I collected my specimens on rocks in a small (½-1 m wide), very steep, meltwater stream on Mt. Baker, Washington. The adults could run about on the rocks very rapidly and were difficult to catch with an aspirator. Furthermore, they were very reluctant to fly and could not be caught by sweeping a net close to the rocks.

LOCATION OF TYPES. — The holotype is a slide-mounted specimen from: USA, Washington, 3 mi. E., 6 mi. S. of Glacier, on rocks in meltwater stream, at timberline on Mt. Baker, 7 Sept. 1967, leg. D. Hansen; it is deposited in the collection of the Department of Entomology, University of Minnesota, St. Paul, Minnesota. All other specimens examined are designated as paratypes and are deposited as shown in "material examined."

Diamesa ancysta Roback

D. ancysta Roback, 1959: 1-2, Figs. 1-4 (described from 1 male from Montana; figures hypopygium, $Tm_{4\ \&\ 5}$).

Description (unless otherwise stated, n = 5 and measurements are in microns): as in *D. mendotae* except:

TOTAL LENGTH. — 5.8 (5.0-6.7) mm.

COLORATION (pinned specimen). — about as in *D. mendotae*.

ANTENNA. — longest flagellar setae 0.71 (0.65-0.79)L_{fl}; Flm_{13} with apical 0.17-0.23 spindle-shaped, mainly swollen ventrally; 2-4 short, slender setae dorso- and ventro-medially on Flm_1; long (MaxL 883-1268) flagellar setae 1-2 on Flm_1, 3-8 on Flm_2, 7-9 on Flm_3, increasing to about 13-16 on Flm_{12} (difficult to count on slides available), numerous on Flm_{13}; $\overline{L}_{flm\,1\text{-}13}:\overline{W}_{flm\,1\text{-}13}$ 107:73, 23:60, 25:58, 29:52, 28:53, 27:52, 27:51, 28:49, 33:48, 31:47, 38:46, 36:45, 1019:44; AR 2.16 (1.29-2.45); 1 preapical antennal seta; L_{pas} 49 (42-56); D_{pd} 209 (184-245); 1-2 pedicellar setae ventro-medially; H_{sc} 220 (198-245).

HEAD. — W_h 764 (717-809); dorsal ocular apodeme nearly absent to moderate; IOS/side 5 (3-8); PtOS about 15; inner verticals reaching to 0.50-0.65 of distance from dorso-medial margin of eye to midline of vertex. Clypeus slightly swollen anteriorly, about as long as wide; CS 17 (13-23). H_e 329 (303-364). $\overline{L}_{ps\,2\text{-}5}:\overline{W}_{ps\,2\text{-}5}:\overline{MaxL}_{pss\,2\text{-}5}$ 132:44:130, 195:51:154, 191:45:136, 272:37:52; CP 0.96 (0.90-1.04); palpal stoutness 4.46 (4.21-4.61).

THORAX. — L_{th} 1.61 (1.50-1.73) mm, D_{th} 1.48 (1.38-1.65) mm. Antepronotal notch right-angled to slightly obtuse, medial corners rounded; LAS/side 9-14 (n = 3). Dorsocentrals uniserial or slightly staggered posteriorly; DCS/side 13 (7-18) (n = 20), $MaxL_{dcs}$ 188-244 (n = 3); PAS/side 14 (8-19); scutellar setae dispersed or very roughly in 3 rows; ScS about 46 (about 35-about 61) (difficult to count in slides available); ASR not measurable on slides available; 1-6 setae on epimeral II protuberance; 1 small seta antero-ventrally on postanepisternum II on 1 specimen.

WING. — L_w 4.1 (3.5-4.4) mm, W_w 1.25 (1.12-1.36) mm. Costal projection 114 (90-140) or 6.0 (5.0-6.6) times its width; VR 0.91 (0.90-0.93). Remigium with 1-2 (rarely 4) setae on hand, 0-2 weak setae and about 14-20 campaniform sensilla just beyond wrist, and 2-3 setae and 3-5 large and 10-12 smaller campaniform sensilla on distal 0.5 of forearm. Setae 19 (17-21) on R, 11 (10-13) on R_1, 2-6 on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 3 ventrally on Sc just beyond arculus, 2-3 dorsally on R_1, 1 (rarely 2) dorsally and 1 ventrally near base of R_{2+3}, and 3 (1-4) dorsally on R_{4+5}. Squama with 62 (50-75) strong setae, $MaxL_{sq}$, 211 (178-238).

	Fe	Ti	Tm_1	$Tm_{2\text{-}5}$	LR	BV	SV
P_I	1560 (1430–1680)	1820 (1680–1930)	1280 (1160–1390)	1370 (1210–1500)	0.70 (0.65–0.74)	3.40 (3.28–3.54)	2.65 (2.54–2.82)
P_{II}	1770 (1610–1960)	1680 (1510–1830)	830 (740–920)	1060 (940–1160)	0.49 (0.48–0.53)	4.05 (3.88–4.33)	4.17 (3.91–4.33)
P_{III}	1990 (1790–2200)	2060 (1830–2300)	1330 (1140–1460)	1390 (1240–1480)	0.65 (0.61–0.70)	3.85 (3.72–4.02)	3.06 (2.87–3.20)

LEGS. — $\bar{L}_{p_I}:\bar{L}_{tot}$ 1.04; Fe I with postero-dorsal beard of 20-30 long setae on proximal 0.6. Apical spur of Ti I long, slender, with sparse prickles on basal 0.3; L_{tispI} 91 (64-100); L_{tispII} 60 (52-62); $L_{atispIII}$ 61 (57-64), $L_{ptispIII}$ 100 (95-109). Ti III with posterior comb of 16-23 spines arranged in a fairly regular single row. Spiniform setae on first 3 tarsomeres of P I-III as follows: 8 (4-12), 2-4, 0; 11 (7-14), 5-8, 0-1 (at 0.7); 17 (15-20), 8-11, 0-2 (between 0.4 and 0.8). Lengths and ratios of leg segments, p. 58.

HYPOPYGIUM (without reference to *D. mendotae*). — Fig. 125. Tg IX with 13 (10-17) setae/side. Anal point strong, gradually broadening basally, with short apical peg and usually with distal keel; strong apodemes on underside of Tg IX diverging and arching to antero-lateral corners of Tg IX (occasionally more parallel near base of anal point, as in *D. mendotae*); L_{gncx} 343 (330-360); $\bar{L}_{tot}:\bar{L}_{gncx}$ 17. Basal plate very well developed, with numerous strong microtrichia ventrally, disto-medial margin rounded and strongly produced. Medial field well developed, dorsal border not well delimited proximally but forming a fairly sharp ridge just slightly free from gonocoxite distally; medial field with numerous microtrichia, with setae particularly strong ventrally; usually several setae are found on an ill-defined mound ventrally on medial field; distal end of medial field fairly broad, free, straight or slightly curved mesad; medial field with 4-7 setae in proximo-dorsal corner. Basimedial setal cluster with numerous very long, strong setae radiating fan-like, setae reaching to base of opposite cluster. Gonostylus approximately of equal width throughout, with subterminal peg and short terminal ridge. Sternapodeme slender medially, with short projections anterolaterally; fore margin straight to concave medially. Basal wedge very strong, rugose, ending before distal margin of basal plate.

DIAGNOSIS. — Antenna plumose, eyes hairy; basal plate very strong, produced disto-medially; basimedial setal cluster strong; gonostylus fairly slender. *D. haydaki* is similar but lacks a well-developed basal plate. *D. cheimatophila* has a broader gonostylus and a larger medial field with a much larger free distal end. *D. chiobates* has fewer setae in the basimedial setal cluster and a broader, postero-mesad-directed free end of the medial field. *D. vockerothi* has a less well developed basal plate and stronger gonostylus and medial field.

MATERIAL EXAMINED. — *Alaska,* various localities near Anchorage, Seward Highway, and on Kenai Peninsula, June, Aug., Sept., Nov., 1965 and 1966, jeep trap, leg. K. M. Sommerman, 13 males (USNM); Matanuska, 4-27-44, leg. J. C. Chamberlin, rotary trap, 1 male (USNM); *Colorado,* 1 mile W of Golden, on rocks in Clear Creek, 27 March 1968, leg. D. Hansen, 1 male partly emerged from pupa, many pupal exuviae (UMn); *Idaho,* Latah Co., Trails Pond, found on ice and snow, 7 March 1969, leg. J. M. Gillespie, 9 males (UId and UMn); Lemhi Co., Salmon River, Hwy 93, 20 miles south of Salmon, 7 March 1965, leg. A. V. Nebeker, 1 male (ANSP); *Montana,* National Lead Co. Mill, near Greenough, Blackfoot River 3/19/58, leg. J. C. Spindler and A. N. Whitney, holotype male (ANSP); *Nevada,* Reno, 23 Dec. 1915, 29 Jan., 4 Feb., 5 Feb., 10 Feb. 1916, 6 males (USNM); *Utah,* Salt Lake County, Big Cottonwood Creek: various localities along creek, various dates in Feb., March, 1965, leg. A. V. Nebeker, 14 males (ANSP); *Washington*, 12 mi. E, 3 mi. S of Glacier, east side of Mt. Baker, Artists' Point, 12 Sept. 1967, leg. D. Hansen, 2 males (UMn); Pullman, 15 March 1899, leg. R. W. Doane, 1 male (WashStU).

DISCUSSION. — Dr. S. S. Roback kindly loaned me the holotype of of *ancysta* for examination. The hypopygium is slightly flattened on the slide, but the shape of the gonostylus, medial field, and produced basal plate are clear. The strong setae below the medial field are not on as pronounced a mound as in Fig. 125, and the AR is higher (2.6) than in my material, but this seems within the expected range of specific variation.

LOCATION OF TYPE. — Holotype male at the ANSP.

Diamesa arctica (Boheman)

Chironomus arcticus Boheman, 1865: 574-575 (described from Spitsbergen).

Diamesa arctica (Boheman). Holmgren, 1869: 8, 48 (records 6 males, 9 females from Green Harbour, Spitsbergen).

D. poultoni Edwards, 1922: 213-214 (described from 9 males, 11 females from Spitsbergen and Prince Charles' Foreland; suggests it "may have formed part of Holmgren's series of *D. arctica*").

D. arctica (Boh.) (= *poultoni* Edw.). Edwards, 1924: 163, 173 (examination of Boheman's and Holmgren's material of *D. arctica;* synonymizes *D. poultoni*); Edwards, 1937: 360 (records 9 males, 9 females from North-East Land (off Spitsbergen)); Oliver, 1963: 177 (records from Hazen Camp, Ellesmere Island); Kureck, 1966: 276-277 (periodicity of emergence of adults from meltwater stream on Spitsbergen; specimens determined by Serra-Tosio); Serra-Tosio, 1967a: 204-208 (description, figure of genitalia, discussion of application of name *arctica;* records specimen from Brundin collection from Sweden); Hirvenoja, 1967: 52-53 (records 16 males, 12 females from Spitsbergen); Serra-Tosio, 1969a: 205, 206 (records additional specimens from Brundin collection from Sweden (B-147: Lappland: Riksgransen, River Katterjokk, 9-9-1950)); Serra-Tosio, 1971: 143-145, Fig. 54.1-3 (description of adult male, distribution, figures of hypopygium);

[*non*] *D. arctica* (Boh.). Kieffer, 1911a: 274-275 (records 3 females from Bear Island, 3 males, 1 female from Spitsbergen; Kieffer (1919: 42) later states that he misdetermined the specimens and renames the species *D. lundstroemi*); Kieffer, 1911b: 19 (brief note of eye pubescence in (apparently) the above specimens); Kieffer, 1919: 41 (misdetermination of some species with 10 flagellomeres); Edwards, 1922: 212-213 (misdetermination of *D. bohemani* Goet.); Edwards, 1924: 163, 173 (says what he (Edwards, 1922) determined as *D. arctica* is possibly *D. waltli* Mg.); Goetghebuer and Lindroth, 1931: 280 (records from Iceland; misdetermination of *D. bohemani*); Edwards, 1932: 45 (misdetermination of *D. bohemani;* suggests it may be incorrectly determined); Mani, 1968: 393 (states it was collected in Alaska, but localities given are those

given by Malloch (1919) for *Pseudodiamesa arctica* (Malloch)); Young, 1969 misdetermination by D. Hansen (chagrin) of *D. spinacies* Saether).
[?]*D. arctica* (Boh.). Edwards, 1925: 356 (records 2 females from Spitsbergen).

Description (unless otherwise stated, n = 4 and measurements are in microns): as in *D. mendotae* except:

TOTAL LENGTH. — 4.6 (4.1-4.9) mm.

COLORATION. — not noted before slide mounting.

ANTENNA (n = 1). — longest flagellar seta $0.62L_{fl}$; Flm_{13} with apical 0.21-0.22 spindle-shaped, mainly swollen ventrally; 2 short, slender setae dorso- and ventro-medially on Flm_1; long (MaxL 843) flagellar setae 1 on Flm_1, 4 on Flm_2, 7 on Flm_3, increasing to 13-15 on Flm_{12}, numerous on Flm_{13}; $\overline{L}_{flm_{1-13}} : \overline{W}_{flm_{1-13}}$ 85:46, 22:39, 22:41, 24:41, 24:41, 24:39, 24:39, 29:37, 29:37, 32:37, 34:37, 37:37, 737: 37; AR 1.56; 1 preapical antennal seta; L_{pas} 40; D_{pd} 166 (159-178) (n = 4); 2-4 pedicellar setae ventro-medially (n = 4); H_{sc} 155 (146-163) (n = 4).

HEAD. — W_h 563 (543-594); epistomal suture moderate medially, weak laterally; IOS/side 3-5; PtOS/side 14-16; inner vertical setae not well differentiated from outer verticals; inner verticals reaching to 0.58 (0.50-0.66) of distance from dorso-medial margin of eye to mid-line of vertex. Clypeus slightly swollen anteriorly, about as wide as long; CS 15 (12-19). Eyes not hairy, microtrichia appearing as coarse projections antero-medially, just slightly shorter than height of ommatidial lenses laterally; H_e 250 (232-265). $\overline{L}_{ps_{2-5}} : \overline{W}_{ps_{2-5}} : \overline{MaxL}_{pss_{2-5}}$ 88:39:96, 129:43:89, 124:36:73, 184:31:29; D_{so} 15 (14-16); CP 1.07 (1.00-1.10); palpal stoutness 3.54 (3.23-4.21).

THORAX. — L_{th} 1.14 (1.00-1.26) mm, D_{th} 1.08 (0.95-1.19) mm. Antepronotum with medial commissure strong, not reaching rear margin of phragma I, not surpassing scutal process (n = 1); antepronotal notch obtuse, weak, with medial corners rounded and moderately surpassing scutal process (n = 1); LAS/side 7 (4-13). Postpronotal apophyses weak in slides available; dorsocentrals uniserial; DCS/side 7-9, $MaxL_{dcs}$ 153 (139-168); PAS/side 8 (5-10); ScS 28 (22-40), $MaxL_{scs}$ 208 (188-218); ASR 0.66 (0.61-0.69); 0-3 setae on epimeral II protuberance.

WING. — L_w 3.2, 3.7 mm (n = 2), W_w 1.09 mm (n = 1). Dry wing not available. Slide mounted wing showing: costal projection 89-129, or 4.5-5.9 times its width; VR 0.75, 0.89 (n = 2). Remigium with 1 strong seta on hand, 1 weak seta and about 13 campaniform sensilla just beyond wrist, and 1-3 setae and 4 large and about 8 smaller campaniform sensilla on distal 0.5 of forearm. Setae 14 (8-18) on R, 9-12 on R_1, 3-9 on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 3 ventrally on Sc just beyond arculus, 2 dorsally on R_1, 1 dorsally and 1 ventrally near base of R_{2+3}, and 3-5 dorsally on R_{4+5}. Squama with 39-54 strong setae, $MaxL_{sqs}$ about 150.

LEGS. — $\overline{L}_{p_I} : \overline{L}_{tot}$ 0.86. Apical spur of Ti I long, slender, with sparse prickles on basal 0.3-0.5; L_{tispI} 75 (69-90); apical spurs on Ti II slightly stouter, subequal to equal in length, with rather fine prickles on basal 0.5-0.6; L_{tispII} 54 (48-60); $L_{atispIII}$ 45-52, $L_{ptispIII}$ 74-86. Weak polygon pattern occasionally visible near apex of Ti I; polygon pattern on Ti III usually well developed. Spiniform setae on first 3 tarsomeres of P I-III as follows: 2-3, 2 (apical), 0; 9-12, 4-5, 0; 9-15, 6-8, 0-1 (at 0.6). Lengths and ratios of leg segments as follows:

	Fe	Ti	Tm_1	$Tm_{2\text{-}5}$	LR	BV	SV
P_I	1110 (1040–1240)	1160 (1030–1410)	790 (660–970)	910 (810–1080)	0.68 (0.64–0.69)	3.37 (3.30–3.44)	2.92 (2.72–3.16)
P_{II}	1290 (1190–1500)	1070 (960–1230)	500 (420–550)	720 (690–760)	0.47 (0.42–0.53)	3.97 (3.76–4.33)	4.72 (4.32–5.32)
P_{III}	1470 (1340–1680)	1410 (1260–1460)	870 (770–1030)	980 (920–1110)	0.61 (0.56–0.66)	3.82 (3.65–4.00)	3.35 (3.16–3.61)

HYPOPYGIUM (without reference to *D. mendotae*). — Fig. 134. Tg IX with 10-13 setae/side. Anal point fairly long, slender, with very small apical peg; strong apodemes on underside of Tg IX diverging from base of anal point, running to antero-lateral corners of Tg IX; L_{gncx} 324 (314-341); $\bar{L}_{tot}:\bar{L}_{gncx}$ 14. Basal plate fairly well developed, obtuse to right-angled disto-medially, with numerous microtrichia ventrally. Medial field well developed, with well-delimited dorsal border, with numerous microtrichia and setae; setae particularly strong antero-ventrally; very distal end of medial field free. Gonostylus slender, broadest at about 0.2 its length, then narrowing beyond fairly rapidly, with distal 0.6 tapering just slightly distally; gonostylus with subterminal peg and weak, short terminal ridge. Sternapodeme a fairly simple slender arch, somewhat broadened medially. Basal wedge short but well-developed, slightly rugose.

DIAGNOSIS. — Antenna plumose, eyes not hairy; medial field well developed, distal end free, dorsal border well delimited. *D. spinacies* is the closest species; see its diagnosis.

MATERIAL EXAMINED. — *Alaska*, Kenai Pen., Seward-Primrose GC, 17 June 1965, K. M. Sommerman, jeep trap, 2 males (USNM); Palmer, 23 IX 1964, jeep trap, K. M. Sommerman, 1 male (USNM); [*North West Territories*], Resolute Creek, Cornwallis Is., 14.VIII.60, D. R. Oliver, NC. 6-3, 1 male (CNC); ND 16-4, Devon Is., 5.IX.60, Devon Is. Exp., coll. D. R. Oliver, 4 males (CNC); ND.15-5, Stream in canyon near Base Camp, Devon Is., 4.IX.60, D. R. Oliver, 5 pupae (CNC); ND 17, Truelove R., Devon Is., 5.IX.60, D. R. Oliver, about 32 pupae (CNC); ND. 17-5, Truelove R., Devon Is., 5.IX.60, Devon Is. Exp., coll. D. R. Oliver, 3 teneral males (CNC).

DISCUSSION. — Like a good number of chironomids, *arctica* is unrecognizable from its original description. Edwards (1922) described *D. poultoni* and *poultoni* var. *flavipila* from Spitsbergen and Prince Charles Foreland; fortunately, he did figure the hypopygium. Two years later, Edwards (1924) examined the material of both Boheman and Holmgren at the Stockholm Museum and was thus able to synonymize his *D. poultoni* with *arctica*. It seems a little surprising, therefore, that Edwards (1932) later incorrectly applied the name *arctica* to *D. bohemani*. Oliver (1963) first recorded the species from the Nearctic.

D. arctica is obviously most closely related to *D. spinacies*. It differs from *spinacies* mainly in the shape of the gonostylus.

LOCATION OF TYPES. — Edwards (1924) states that Boheman's oriinal material was, at that date, in the Stockholm Museum. I have not borrowed any of Boheman's series of *arctica*, nor has any other worker, but I presume it is still extant. A lectotype should, of course, be eventually designated from Boheman's material.

Diamesa bertrami Edwards

D. bertrami Edwards, 1935: 470 (described from 1 male from Cape Dalton, East Greenland; figures hypopygium); Pagast, 1947: 465 (suggests his new species *D. kasailica* is possible *D. bertrami*); Brundin, 1947: 47 (records 1 male from Sweden); Wuelker, 1959: 339, 344 (notes Thienemann's (1950c) misdetermination of *D. bertrami* as *D. latitarsis*); Oliver, 1962: 5, 6 (records 8 males from Bear Island; figures hypopygium); Serra-Tosio, 1964: 46 (records from France); Serra-Tosio, 1966: 125, 126, 127 (records from France, discussion of distribution); Laville, 1966: 209 (records 3 males from Lac d'Oredon, France); Albu, 1967 (reference cited by Serra-Tosio (1971), not seen by author); Saether, 1968: 455 (records 3 males from Finse area, Norway); Serra-Tosio, 1969a: 205 (records 54 males from Brundin collection from Sweden and Norway); Serra-Tosio, 1970c: 26 (records 7 males from Granada, Spain); Serra-Tosio, 1971: 147-155, Figs. 56-59, 153 (description of male and female adults and pupae; distribution; ecology).

D. latitarsis Goet. Thienemann, 1950c: 204-206 (misdetermination; figures hypopygium).

D. spec. II. Thienemann, 1941: 189 (records female pupal exuviae from Swedish Lapland); Pagast, 1947: 525, 573 (description of pupa; *fide* Wuelker, 1959, Serra-Tosio, 1964).

Description (unless otherwise stated, n = 3 and measurements are in microns): as in *D. mendotae* except:

TOTAL LENGTH. — 3.5 (3.2-4.0) mm.

COLORATION. — not noted before slide mounting.

ANTENNA. — longest flagellar seta 0.65-0.75L_{fl}; Flm_{13} with apical 0.24-0.29 spindle-shaped, mainly swollen ventrally; 1-2 short, slender setae dorso- and ventromedially on Flm_1; long (MaxL 654-900) flagellar setae 1 on Flm_1, 3 on Flm_2, 6-9 on Flm_3, 7-10 on Flm_4, increasing to 14-15 on Flm_{12}, numerous on Flm_{13}; setae on basal 0.2 of spindle-shaped region of Flm_{13}; $\overline{L}_{flm_{1\text{-}13}}:\overline{W}_{flm_{1\text{-}13}}$ 79:48, 19:42, 24:41, 26:39, 26:39, 30:39, 32:38, 35:38, 39:37, 41:35, 43:34, 43:35, 608:34; AR 1.25 (1.12-1.46); 1 preapical antennal seta; L_{pas} 33 (24-42); D_{pd} 157 (146-166); 1-3 pedicellar setae ventro-medially; H_{sc} 172 (147-189).

HEAD. — W_h 584 (553-625); dorsal ocular apodeme absent to weak; epistomal suture weak medially, absent laterally; IOS/side 2-3; postocular setae in uniserial row running from near postero-ventral margin of eye dorsally to merge with about 4 stronger, longer outer vertical setae; inner vertical setae few (about 6), shorter, weaker, more curved and decumbent than outer verticals, roughly in a line or only slightly dispersed on dorsal region of vertex; inner verticals reaching to 0.33-0.40 of distance from dorso-medial margin of eye to midline of vertex. Clypeus slightly swollen anteriorly, about as wide as long; CS 9 (7-14). Eyes hairy, microtrichia about 1.5 times height of ommatidial lenses; dorso-medial margin extending not quite as far mesad as ventro-medial margin; H_e 285 (279-289). $\overline{L}_{ps_{2-5}}:\overline{W}_{ps_{2-5}}:\overline{MaxL}_{pss_{2-5}}$ 85:30:83, 137:37:73, 140:29:75, 152:25:27; D_{so} 14 (12-16); CP 1.08 (0.94-1.27); palpal stoutness 4.5 (3.95-4.91).

Thorax. — L_{th} 1.05 (0.95-1.20) mm (n = 5), D_{th} 1.01 (0.90-1.17) mm (n = 5). Antepronotum with medial commissure strong, not quite reaching rear margin of phragma I, slightly surpassing anterior margin of scutal process; antepronotal notch right-angled to very obtuse, medial corners broadly to very broadly rounded and moderately or only slightly surpassing scutal process; LAS/side 7-10. Dorsocentrals uniserial; DCS/side 8 (6-11) (n = 10), $MaxL_{dcs}$ 150 (n = 2); PAS/side 6 (5-8); scutellar setae dispersed; ScS 14-26 (n = 2), length not measurable on slides available; ASR 0.63 (0.58-0.68); 1-4 setae on epimeral II protuberance.

Wing. — L_w 2.8 (2.5-3.0) mm, W_w 0.88 (0.80-0.94) mm. Dry wing not available. Slide mounted wing showing: costal projection 59-109 or 3.8-5.5 times its width; M_{1+2} weak; apparent m-cu distal to apparent fCu by about 2-3 times width of apparent m-cu; VR 0.92 (0.90-0.94). Remigium with 1 strong seta on hand, 1 weak seta and apparently about 6-about 14 campaniform sensilla just beyond wrist, and 2-3 setae and 4-5 large and about 7 smaller campaniform sensilla on distal 0.5 of forearm. Setae 12-13 on R, 10-11 on R_1, 1-2 on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 3 ventrally on Sc just beyond arculus, 2 dorsally on R_1, 1 dorsally and 1 ventrally near base of R_{2+3}, and 0-2 dorsally on R_{4+5}. Squama with 34, 38 (n = 2) strong setae, $MaxL_{sqs}$ 139, 150 (n = 2).

Legs. — $\overline{L}_{p_I}:\overline{L}_{tot}$ 1.27. Fe I with only 1 long seta (other setae possibly forming femoral beard broken off in slides available). Apical spur of Ti I long, slender, with very sparse, short prickles on basal 0.3-0.5; L_{tispI} 64-79; apical spurs of Ti II stouter, subequal to equal in length, with fairly numerous prickles on basal 0.5; L_{tispII} 45-55; apical spurs of Ti III with numerous prickles on basal 0.4-0.5; $L_{atispIII}$ 43-52, $L_{ptispIII}$ 64-79. Polygon pattern on Ti III well developed. Ti III with posterior comb of 15-18 spines arranged in fairly regular row. Spiniform setae on first 3 tarsomeres of P I-III as follows: 2 (apical), 2 (apical), 0; 8-11, 3, 0; 12-13, 4-7, 0. Lengths and ratios of leg segments as follows:

	Fe	Ti	Tm_1	Tm_{2-5}	LR	BV	SV
P_I	1040–1240	1210–1480	920–1110	860–1090	0.75–0.83	3.50–4.06	2.24–2.45
P_{II}	1160–1340	1130–1340	550–660	660–790	0.48–0.50	4.22–4.32	4.09–4.19
P_{III}	1280–1530	1340–1630	910–1080	870–1040	0.64–0.68	4.04–4.09	2.89–3.09

Hypopygium. — indistinguishable from *D. chorea*.

DIAGNOSIS. — Antenna plumose, eyes hairy, basimedial setal cluster absent. The shape of the gonostylus and medial field are unlike any other *Diamesa* with hairy eyes. The hypopygium of D. *chorea* is identical, but *chorea* has non-hairy eyes.

MATERIAL EXAMINED. — [*Bear Island*], Tromsö Museums Björnöya Expd., Sta. 19, Bear I. 25.VIII.1957, 1 male (CNC); Svarthulpen, 25. Aug. 1957, Tromsö Mus. Bear Is. Expd., No. B [3?].3, 1 male (CNC); [*Austria*], Obergurgl, TIROL, 1950m., 18, 20, 26-VII, 8-VIII-1953, J. R. Vockeroth, 4 males (CNC).

DISCUSSION. — Edwards (1935) described *bertrami* from a single specimen from Greenland. The hypopygial figure he drew was rather poor, however. Thienemann (1950c) briefly described the species (misdetermined as *latitarsis*) and presented a hypopygial figure drawn by Strenzke. He apparently noticed the fine fringe of setae on the aedeagal lobes. Oliver (1962) gave an accurate hypopygial figure of a specimen from Bear Island and stated that the species is similar to *D. clavata.* Actually, *bertrami* is almost identical to *chorea;* see its discussion.

LOCATION OF TYPE. — British Museum (Natural History). I did not see the holotype.

Diamesa bohemani Goetghebuer

D. bohemani Goetghebuer, 1932: 181 (in part) (description of specimens from Austria, Iceland, and Spitsbergen; figures hypopygium, which is actually that of what is now called *D. zernyi* Edw.; described as "nom. nov." for *Waltli* Edw. *nec* Meig. and *arctica* Edw. *nec* Boh.); Edwards, 1933: 616-617 (records 1 male from Akpatok Island, Hudson Strait; splits "*bohemani*" into a northern and a southern species, *bohemani* and *zernyi* Edw., respectively); Pagast, 1947: 480-481, 530 (description of adult male; figures hypopygium; description of pupa of *zernyi,* with mention that a pupal exuviae from East Greenland, probably *bohemani,* was indistinguishable from that of *zernyi*); Thienemann, 1950b: 543, 565 (regards as the northern member of the "species pair" *bohemani-zernyi*); Wuelker, 1958: 807 (records from Germany); Wuelker, 1959: 349-350 (discussion of nomenclatorial confusion); Oliver, 1962: 6, Fig. 3 (records 7 males from Bear Island; figures hypopygium); Albu, 1967 (cited by Serra-Tosio, 1971; not seen by author); Saether, 1968; 455-456 (records 5 males from Finse area, Norway); Serra-Tosio, 1969a: 205, 206 (records 65 males from various localities in Sweden, from Brundin collection); Serra-Tosio, 1971: 211-214, Fig. 90, 91 (description of adult male, male pupa; distribution; records from Spitsbergen, Sweden, Norway).

D. arctica [Boh.]. Edwards, 1922: 212-213, Fig. 13 (misdetermination of 1 male from Spitsbergen); Goetghebuer and Lindroth, 1931: 274 (records 3 males and 5 females from Iceland); Edwards, 1932: 45 (records from Loch Einich and Loch Laidon; states it may not be *arctica*).

D. edwardsi Goetghebuer, *in* Goetghebuer and Lenz, 1939: 13, Fig. 20 (as "nom. nov." for *D. Waltli* Edw. *nec* Meig. and *arctica* Edw. *nec* Boh.); Soot-Ryen, 1942: 83 (records 1 male from Spitsbergen (det. Goetghebuer)); Soot-Ryen, 1943: 19 (records 2 males, 1 female from northern Norway (det. Goetghebuer)); Brundin, 1947: 47 (records 5 males, 1 female from Sweden).

D. Waltli Mg. Edwards, 1929: 304-305, Fig. 2d (questions determination; states he has "seen only 1 British male, from Whernside"); Coe, 1950: 136, Fig. 182d new records in Great Britain).

[*non*] *D. bohemani* Goet. Goetghebuer and Lenz, 1939: 11 (as senior synonym to *D. zernyi* Edw., *arctica* Goet. *nec* Boh.; misdetermination of *zernyi*); Laville, 1966: 209 (misdetermination of *D. zernyi, fide* Serra-Tosio, 1969: 206).

[*non*?] *D. bohemani* Goet. Goetghebuer, 1945: 197 (records from Belgium; actually *zernyi*?).

Description (unless otherwise stated, n = 3 and measurements are in microns): as in *D. mendotae* except:

TOTAL LENGTH. — not measurable on slides available.

COLORATION. — not noted.

ANTENNA (n = 1). — longest flagellar setae 0.70 L_{fl}; Flm_{13} wth apical 0.23 spindle-shaped, mainly swollen ventrally; 2 short, slender setae dorso- and ventromedially on Flm_1; long (MaxL 900) flagellar setae 1 on Flm_1, 3 on Flm_2, 7 on Flm_3, increasing to about 14 on Flm_{12}, numerous on Flm_{13}; $L_{flm_{1-13}}$ 101, 16, 24, 28, 30, 36, 40, 42, 46, 50, 55, 50, 720; AR 1.29; 1 preapical antennal seta; L_{pas} 46; D_{pd} 180; 3 pedicellar setae ventro-medially; H_{sc} 178.

HEAD (n = 1). — W_h 622; dorsal ocular apodeme moderate; IOS/side 2, 3; PtOS about 13; inner verticals reaching to about 0.5 of distance from dorso-medial margin of eye to midline of vertex. Clypeus slightly swollen anteriorly, about as wide as long; CS 14. H_e 278. $L_{ps_{2-5}}:W_{ps_{2-5}}:MaxL_{pss_{2-5}}$ 99:30:91, 135:48:89, 143:36:79, 216:32:22; D_{so} 14; CP 1.07; palpal stoutness 3.77.

THORAX (n = 1). — L_{th} 1.24 mm, D_{th} 1.17 mm. Antepronotum with medial commissure and antepronotal notch not visible in slides available; LAS/side 10; dorsocentrals apparently uniserial; DCS/side 13, $MaxL_{dcs}$ 188; PAS/side 9; ScS 26, $MaxL_{scs}$ 200. ASR 0.61; 4 setae on epimeral II protuberance.

WINGS. — L_w 3.3-3.6 mm, W_w 1.02-1.14 mm. Costal projection 97-117 or 5.0-6.0 times its width; apparent m-cu distal to apparent fCu by about 2-3 times width of apparent m-cu; VR 0.91-0.94. Remigium with 1 strong seta on hand, 0-1 seta and about 11-13 campaniform sensilla just beyond wrist, and 1-4 setae and 4 large and 7-11 smaller campaniform sensilla on distal 0.5 of forearm. Setae 14-22 on R, 8-14 on R_1, and 3-9 on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 3 ventrally on Sc just beyond arculus, 2-3 dorsally on R_1, 1 dorsally and 1 ventrally near base of R_{2+3}, and 3-4 dorsally on R_{4+5}. Squama with 34-62 strong setae, $MaxL_{sqs}$ 173-200.

LEGS. — $\bar{L}_{p_I}:\bar{L}_{tot}$ not measurable on slides available. Apical spurs of Ti I long, slender, with sparse prickles on basal 0.3; apical tibial spurs otherwise as in *D. mendotae*. Spiniform setae on first 3 tarsomeres of P I-III as follows: 2 (apical)-5, 2 (apical), 2 (apical); 12-14, 6-8, 2 (apical); 12-18, 6-10, 2 (apical)-3. Lengths and ratios of leg segments as follows:

	Fe	Ti	Tm_1	Tm_{2-5}	LR	BV	SV
P_I	1310– 1560	1510– 1720	1060– 1240	1160– 1340	0.70– 0.72	3.35– 3.70	2.64– 2.67
P_{II}	1430– 1760	1390– 1690	720– 840	870– 1060	0.50– 0.53	4.05– 4.33	3.91– 4.10
P_{III}	1650– 1930	1700– 2060	1110– 1360	1160– 1330	0.62– 0.66	3.84– 4.06	2.93– 3.23

HYPOPYGIUM (without reference to *D. mendotae*). — Fig. 115. Tg IX with 11-17 setae/side. Anal point very strong, fairly broad, broadening basally, with distal keel, with or apparently without apical peg; strong apodemes on underside of Tg IX diverging and arching to antero-lateral corners of Tg IX; L_{gncx} 558-568; L_{tot}:L_{gncx} not measurable. Gonocoxite very long, slender; basal plate scarcely developed. Medial field well developed, very long, with dorsal border fairly well delimited; medial field with very few microtrichia but with numerous strong, anteriorly-directed setae on distal 0.4; distal end of medial field free. Basimedial setal cluster with about 15 long, strong setae directed antero-mesad, setae reaching to or just beyond midline of hypopygium; basimedial setal cluster located posterior to posterior margin of basal foramen. Gonostylus short, broadest at about 0.3, with strong subterminal peg and short terminal ridge. Sternapodeme fairly broad medially, with weak antero-lateral projections; fore margin slightly concave medially. Basal wedge weakly sclerotized, very broad, rugose, reaching about to level of posterior margin of Tg IX.

DIAGNOSIS. — The long, slender gonocoxite, strong anal point, and medial field with the anteriorly-directed setae are unlike any other Nearctic species. The European *D. zernyi* can be distinguished by the characters in Serra-Tosio (1971).

MATERIAL EXAMINED. — [*Iceland*], Surtsey, Vestmannaeyjar Island 28.VI.1966, coll. H. Andersson, *Diamesa zernyi* Edw. [det. ?], 1 male (CNC); Heimacy Loc. 7 [?], Vestmannaeyjar, Iceland, 23 July 1965, coll. H. Andersson, *Diamesa zernyi*, det. D. R. Oliver, 1 male (CNC); Surtsey, Vestmannaeyjar Iceland, 14.VII.1967, coll. H. Richter, *Diamesa zernyi*, det. D. R. Oliver, No. DRO 8-51, 1 male (CNC); [*Greenland*], 500 ft. S. Greenland, VIII.29.47, J. M. Amberson, *Diamesa bohemani* Goetgh., det. Stone, 2 males (USNM); [North West Territories], Fly'g over and nr. stream, valley head, A. K. Gregson, 3 Sept. 1931, O. U. Exp. 1931, S. Akpatok I., Ungava Bay, N. Canada, A. K. Gregson, d.d. 1931, *Diamesa bohemanni* [*sic*] Gret. [*sic*], Det. in B. M. F. W. Edwards May 1933, 1 male (Oxford).

DISCUSSION. — The nomenclatorial treatment of *bohemani* was discussed by Wuelker (1959); records since then are given in my synonymy. Oliver (1962) stated that *bohemani* lacks a basimedial setal cluster and is therefore distinguishable from *D. zernyi* which does have basimedial setae. *D. bohemani* does, however, have a basimedial setal cluster, although the number (up to 15) and the length (reaching about to the midline of the hypopygium) of the setae are less than in *zernyi* (cf. Serra-Tosio, 1971: Pls. 83, 84 and 90, 91).

Location of type. — Edwards (1933) designated a male from Spitzbergen in the BM(NH) as the holotype.

Diamesa cheimatophila [5] **n. sp.**

Description (unless otherwise stated, n = 5 and measurements are in microns): as in *D. mendotae* except:

Total length. — 5.3 (4.8-5.8) mm (n = 4).

Coloration (pinned specimen). — as in *D. mendotae*.

Antenna. — longest flagellar setae 0.72 (0.68-0.75)L_{fl}; Flm_{13} with apical 0.17-0.27 spindle-shaped, mainly swollen ventrally; 2 short, slender setae dorso- and ventro-medially on Flm_1; long (MaxL 768-1024) flagellar setae 1 on Flm_1, 3-4 on Flm_2, 8-10 on Flm_3, increasing to 13-15 on Flm_{12}, numerous on Flm_{13}; setae on basal 0.2-0.4 of spindle-shaped apex of Flm_{13}; $\overline{L}_{flm_{1\text{-}13}}:\overline{W}_{flm_{1\text{-}13}}$ 103:67, 22:58, 23:58, 27:54, 25:51, 23:50, 24:48, 26:47, 29:45, 32:45, 34:42, 36:42, 888:40; AR 1.88 (1.69-2.06); 1 preapical antennal seta; L_{pas} 50 (41-56); D_{pd} 188 (171-198); 1 or 2 pedicellar setae ventro-medially; H_{sc} 197 (180-203).

Head. — W_h 733 (666-778); dorsal ocular apodeme absent or weak; epistomal suture usually strong medially, weak laterally; IOS/side 5 (3-8); inner verticals reaching to 0.39-0.63 of distance from dorso-medial margin of eye to midline of vertex; CS 16 (15-19); H_e 331 (298-355); $\overline{L}_{ps_{2\text{-}5}}:\overline{W}_{ps_{2\text{-}5}}:\overline{MaxL}_{pss_{2\text{-}5}}$ 128:52:139, 182:59:193, 190:50:197, 253:38:62; CP 0.99 (0.92-1.06); palpal stoutness 3.76 (3.47-4.07).

Thorax. — L_{th} 1.35 (1.17-1.51) mm, D_{th} 1.24 (1.09-1.41) mm (n = 6). Antepronotum with medial commissure strong, not quite reaching to rear margin of phragma I, reaching to or slightly surpassing anterior margin of scutal process; antepronotal notch acute to right-angled, medial corners rounded; LAS/side 8 (5-11); dorsocentrals uniserial to slightly staggered posteriorly; DCS/side 11 (8-15), $MaxL_{dcs}$ about 286 (n = 4); PAS/side 6 (5-10); ScS about 28-32 (n = 4), $MaxL_{scs}$ 270-327 (n = 4); ASR 0.62 (0.58-0.65); 0-4 setae on epimeral II protuberance.

Wing. — L_w 3.9 (3.2-4.3) mm, W_w 1.20 (1.02-1.28) mm. Costal projection 123 (89-149) or 6.0 (4.5-6.5) times its width; VR 0.91 (0.90-0.93). Remigium with 0, 1 strong, or 1 strong and 1 weak seta on hand, 0-2 weak setae and about 6-about 15 campaniform sensilla just beyond wrist, and 2-3 setae and 3-4 large and about 9 smaller campaniform sensilla on distal 0.5 of forearm. Setae 14 (9-18) on R, 10 (8-12) on R_1, 9 (8-11) on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 3 ventrally on Sc just beyond arculus, 1-3 dorsally on R_1, 1 (rarely 2) dorsally and 1 (rarely 2) ventrally near base of R_{2+3}, and 2-4 dorsally on R_{4+5}. Squama with 45 (32-58) strong setae, $MaxL_{sqs}$ 140-210.

Legs. — $\overline{L}_{p_I}:\overline{L}_{tot}$ 1.13. Apical spurs essentially as in *D. mendotae*. Spiniform setae on first 3 tarsomeres of P I-III as follows: 6-12, 2-5, 0-1 (at about 0.7); 11-13, 6-8, 0-3; 14-18, 8-11, 2 (at about 0.6). Lengths and ratios of leg segments as follows:

[5] From *cheima, -tos* (Gr.), winter, and *philia* (Gr.), fondness, affection (Brown, 1954). The midge is a "lover of winter."

	Fe	Ti	Tm_1	Tm_{2-5}	LR	BV	SV
P_I	1630 (1390–1760)	1880 (1580–2030)	1210 (1080–1310)	1270 (1140–1340)	0.65 (0.62–0.68)	3.69 (3.54–3.76)	2.89 (2.77–3.00)
P_{II}	1800 (1510–1960)	1670 (1410–1790)	760 (660–820)	980 (860–1060)	0.45 (0.40–0.48)	4.32 (4.19–4.44)	4.61 (4.35–5.12)
P_{III}	2030 (1680–2230)	2020 (1720–2200)	1270 (1110–1380)	1350 (1210–1460)	0.63 (0.60–0.65)	3.92 (3.73–4.03)	3.19 (3.07–3.34)

HYPOPYGIUM (without reference to *D. mendotae*). — Fig. 131. Tg IX with 20 (13-25) setae/side. Anal point strong, broadening slightly basally, with short apical peg and distal keel or ridge; strong apodemes on underside of Tg IX running nearly parallel to near fore margin of Tg IX, then diverging and running along fore margin of Tg IX; L_{gncx} 387 (337-407); L_{tot}:L_{gncx} 14. Basal plate well developed, with numerous strong microtrichia ventrally, disto-medial margin not produced. Medial field well developed, with dorsal border well delimited; medial field with numerous microtrichia, with setae particularly strong ventrally; distal 0.4 of medial field very broad, free, directed straight posteriorly; medial field without distinct group of setae in proximo-dorsal corner. Basimedial setal cluster with numerous very long, strong setae radiating fan-like, setae reaching to base of opposite cluster. Gonostylus fairly broad, with subterminal peg and short terminal ridge. Sternapodeme fairly narrow medially, with antero-lateral projections; fore margin concave medially. Basal wedge very strong, rugose, apex blunt, reaching to or nearly to distal end of basal plate.

DIAGNOSIS. — Antenna plumose, eyes hairy, basimedial setal cluster strong; medial field with broad, posteriorly-directed free end; gonostylus broad. *D. cheimatophila* is most similar to *D. ancysta, chiobates, haydaki,* and *vockerothi.* It is easily separable from these species by its distinctive medial field.

MATERIAL EXAMINED. — *New York*, Chenango Co., East Guilford, 7 March 1966, Knutson, Morse, Pechuman, 2 males (Corn); Ithaca, 16-II-1963, Lambert W. All, 2 males (JES); Ithaca, III.4, 15.1936, H. K. Townes, 12 males (HKT); Ithaca, May, Diamesa nivoriunda Fitch, Det. O. A. Johannsen, 1 male (Corn); Ithaca, Buttermilk, 29-XII-1966, R. G. Beard, 1 male (Corn); Ithaca, Coy Glen, 29-XII-1966, R. G. Beard, col., 1 male (Corn); Ludlowville, 19-I-1963, L. L. Pechuman, on snow, 2 males (JES); Myers, Salmon Creek Bridge, 14 January 1967, leg. L. L. Pechuman, 2 males (Corn); New Field, Tompkins County, Rt. 13 nr. Co. Rd. 133, 2.III.1969, leg. Karl Valley, 3 males (Corn); Tompkins Co., Buttermilk St. Pk., Ithaca 26-II-1966, R. G. Beard, 1 male (Corn); Tompkins Co., Coy Glen, Ithaca, 25 Feb. 1966, R. G. Beard, 3 males (Corn).

DISCUSSION. — *D. cheimatophila* is one of several species of what could be called the "*nivoriunda*" group, that is, species with a strong basimedial setal cluster located below the basal plate. Its recorded emergence times are from December to May, although I presume that it probably starts to emerge in September.

LOCATION OF TYPES. — Holotype is a slide-mounted male from: USA, New York, Newfield, Tompkins County, Rt. 13 nr. Co. Rd. 133, 2.III. 1969, leg. Karl Valley, slide DH 70-75; it is deposited in the Cornell University Collection. All other specimens examined are designated paratypes and are deposited either at Cornell, the University of Minnesota, or Dr. Henry K. Townes' collection.

Diamesa chiobates [6] new species

[?] *D. waltlii* Meigen. Malloch, 1915: 410-411, Pl. XXIII, Fig. 11.

Description (unless otherwise stated, n = 5 and measurements are in microns): as in *D. mendotae* except:

TOTAL LENGTH. — 5.5 (4.4-6.2) mm (n =10).

COLORATION (pinned specimen). — as in *D. mendotae.*

ANTENNA. — longest flagellar setae 0.67 (0.61-0.76) L_{fl}; Flm_{13} with apical 0.14-0.21 spindle-shaped, mainly swollen ventrally; 2 short, slender setae dorso- and ventro-medially on Flm_1; long (MaxL 758-1075) flagellar setae 1 on Flm_1, 4-5 on Flm_2, 8-9 on Flm_3, increasing to about 14-16 on Flm_{12}, numerous on Flm_{13}; setae on basal 0.1-0.3 of spindle-shaped region of Flm_{13}; $\overline{L}_{flm_{1-13}}:\overline{W}_{flm_{1-13}}$ 99:64, 18:43, 22:54, 24:50, 23:49, 24:47, 24:46, 25:45, 29:45, 29:44, 33:42, 36:40, 1003:36; AR 2.39 (2.07-2.72) (n = 10); 1 preapical antennal seta; L_{pas} 45 (38-60); D_{pd} 191 (163-207); H_{sc} 205 (174-213).

HEAD. — W_h 723 (655-778); IOS/side 5 (4-7); PtOS 11-15; inner verticals reaching to 0.45-0.56 of distance from dorso-medial margin of eye to midline of vertex; CS 9 (6-12). H_e 322 (298-348). $\overline{L}_{ps_{2-5}}:\overline{W}_{ps_{2-5}}:\overline{MaxL}_{pss_{2-5}}$ 114:41:127, 179:49:132, 166:39:123, 228:31:48; D_{so} 17 (16-18); CP 1.03 (0.94-1.08); palpal stoutness 3.79 (3.33-4.24).

THORAX. — L_{th} 1.43 (1.28-1.62) mm (n = 10), D_{th} 1.34 (1.21-1.51) mm (n = 10). Antepronotal notch acute to slightly obtuse, medial corners rounded; LAS/side 9 (7-11); postpronotum without setae and with 2 or 3 small, indistinct sensilla (?) on antero-dorsal border; dorsocentrals uniserial or slightly staggered posteriorly; DCS/side 10 (8-13) (n = 20), $MaxL_{dcs}$ 195 (155-224); PAS/side 7.6 (5-11) (n = 16); ScS 27 (20-32), $MaxL_{scs}$ 265 (178-368) (n = 4); ASR 0.60 (0.57-0.64); 0-3 fine setae on epimeral II protuberance.

WING. — L_w 3.5 (2.8-4.2) mm, W_w 1.02 (0.83-1.26) mm. Costal projection 122 (100-140) or 7.3 (6.3-8.6) times its width; VR 0.94 (0.90-0.96). Remigium with 1 or 2 setae on hand, 0-1 weak seta and about 4(?)-about 10 (difficult to count in slides available) campaniform organs just beyond wrist, and 3 (2-6) setae and 2-4 large and about 10 smaller campaniform sensilla on distal 0.5 of forearm. Setae 14 (11-17) on R, 8 (6-12) on R_1, 6 (4-9) on R_{4+5} (uniserial and dorsal on

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[6] From *chion, -os* (Gr.), snow, and *bates* (Gr.), one that walks or treads (Brown, 1954). The species is often found in mid-winter walking about on the snow by an open stream, hence "one that walks on the snow."

all). Campaniform sensilla 3 ventrally on Sc just beyond arculus, 1-2 dorsally on R_1, 1 (rarely 2) dorsally and 1 ventrally near base of R_{2+3}, and 1-3 dorsally on R_{4+5}. Squama with about 32-60 strong setae, $MaxL_{sqs}$ 179 (130-220).

LEGS. — $\bar{L}_{p_I}:\bar{L}_{tot}$ 1.05; Fe I with distinct postero-dorsal beard of about 20-25 long setae on proximal 0.5. Apical spur of Ti I long, slender, with sparse prickles on basal 0.3-0.5; apical spurs otherwise as in *D. mendotae*. Spiniform setae on first 3 tarsomeres of P I-III as follows: 2-7, 2 (apical), 0; 9-13, 4-6, 0; 11-20, 7-10, 0-1 (at about 0.6). Lengths and ratios of leg segments as follows:

	Fe	Ti	Tm_1	Tm_{2-5}	LR	BV	SV
P_I	1530 (1260–1720)	1720 (1410–1960)	1240 (1090–1340)	1260 (1060–1330)	0.72 (0.67–0.77)	3.43 (3.36–3.58)	2.62 (2.45–2.81)
P_{II}	1680, (1360–1960)	1620 (1330–1830)	810 (700–880)	970 (810–1060)	0.50 (0.47–0.53)	4.22 (3.96–4.52)	4.05 (3.85–4.45)
P_{III}	1870 (1500–2230)	1950 (1560–2200)	1280 (1020–1410)	1280 (1060–1410)	0.65 (0.62–0.69)	3.97 (3.80–4.10)	3.00 (2.83–3.26)

HYPOPYGIUM (without reference to *D. mendotae*). — Fig. 126. Tg IX with 13 (8-18) setae/side. Anal point strong, broadening slightly basally, with short apical peg and distal keel; strong apodemes on underside of Tg IX diverging and arching to antero-lateral corners of Tg IX, occasionally running parallel for about 0.5 of length of Tg IX before diverging; L_{gncx} 325 (290-346); $\bar{L}_{tot}:\bar{L}_{gncx}$ 17. Basal plate well developed, with numerous strong microtrichia ventrally. Medial field well developed, dorsal border a fairly sharp ridge becoming free distally; medial field with numerous microtrichia, with setae particularly strong ventrally; distal 0.2 of medial field broad, free, slightly curving mesad; medial field with 3-6 setae in proximodorsal corner. Basimedial setal cluster with about 6-8 long, strong setae, setae reaching nearly to base of opposite cluster. Gonostylus about of equal width throughout, with subterminal peg and short terminal ridge. Sternapodeme fairly slender medially, with antero-lateral projections; anterior border slightly concave medially. Basal wedge very strong, rugose, blunt to pointed apically, not quite reaching distal end of basal plate.

DIAGNOSIS. — Antenna plumose, eyes hairy, basimedial setal cluster with only 6-8 setae; medial field with free distal end broad, curving postero-mesad.

MATERIAL EXAMINED. — *Minnesota*, Hubbard Co., Lower LaSalle Lake, N.J. mosquito trap, 22 Oct. 1970, leg. E. F. Cook, 1 male (UMn); Washington County, 2 mi. W, 1 mi. S of Lakeland, along Valley Creek, 31 Jan. 1967, leg. D. Hansen, 2 males (UMn); Washington County, 2 mi. W, 1 mi. S of Lakeland, by small stream near Valley Creek, 14 Feb. 1967, leg. D. Hansen, 7 males (UMn); *Wisconsin*, 45° 43'N, 92°09'W, 11 mi. E, 4 mi. S of Siren, Burnett County, March, April, Sept., Oct., 1966, 1968, 1969, 50 males (UMn); Mecan R., Waushara Co., T18N, R9E, sec16, Hy 21 bridge, 9 Feb. 1967, leg. R. Narf, 6 males (JES); Sauk Co., Otter Ck., 22-II-1969, leg. R. Narf, 1 male (UMn).

Discussion. — *D. chiobates* is another "*nivoriunda*-group" *Diamesa.* Its basimedial setal cluster is the weakest of any in this group, however, having only 6-8 setae. Malloch's (1915) "*D. waltlii*" is just possibly *D. chiobates,* although Malloch's hypopygial figure also shows a resemblance to *D. heteropus.* I have collected the species in company with *D. mendotae;* recorded emergence times are September-October and January-April, although I presume it emerges from September to May.

Location of types. — Holotype is a male collected in: USA, Wisconsin, 45°43′N, 92°09′W, 11 mi. E, 4 mi. S of Siren, Burnett County. Light trap by small cold stream (Spring Brk) 8 Oct. 1968, leg. Dean Hansen, slide DH69-161. It is deposited in the collection of the Department of Entomology, University of Minnesota, St. Paul, Minnesota. The remaining specimens examined are designated as paratypes and are deposited at the UMn, USNM, CNC, and ANSP.

Diamesa chorea Lundbeck

D. chorea Lundbeck, 1898: 291-293 (described from males from Greenland); Lundstroem, 1918(?): 24, Taf. II, Fig. 36 (figures hypopygium of "Typus-Examplar"); Edwards, 1933: 618 (figures hypopygium of co-type); Edwards, 1935: 471 (records 6 males from Jameson Land); Soot-Ryen, 1943: 19; Pagast, 1947: 472-473 (description of male from Greenland).

[*non*] *D. chorea* Lundbeck. Cole and Lovett, 1921: 212 (misdetermination).

D. aberrata Lundbeck. Edwards, 1935: 471 (in part) (misdetermination of 1 of 4 specimens).

Description (unless otherwise stated, n = 3 and measurements are in microns): as in *D. mendotae* except:

Total length. — 4.4 mm (n = 1).

Coloration. — not noted.

Antenna. — longest flagellar seta 0.67 (0.62-0.71) L_{fl}; Flm_{13} with apical 0.21-0.27 spindle-shaped, mainly swollen ventrally; 2 short, slender setae dorso- and ventro-medially on Flm_1; long (MaxL 720-900) flagellar setae 1 on Flm_1, 3-4 on Flm_2, 6-7 on Flm_3, 10-12 on Flm_4, increasing to 14-15 on Flm_{12}, numerous on Flm_{13}; setae not on or only on basal 0.1 of spindle-shaped region of Flm_{13}; spindle-shaped region of Flm_{13} with numerous slender, pointed sensilla basiconica, apparently without any similar but blunter, shorter sensilla basiconica arising from more distinct pits, and with 5 ringed sensilla coeloconica; $\bar{L}_{flm_{1-13}}:\bar{W}_{flm_{1-13}}$ 82:51, 17:46, 22:44, 27:41, 26:40, 29:41, 32:41, 36:40, 38:38, 39:38, 38:37, 40:38, 666:37; AR 1.42 (1.33-1.62) (n = 5); 1 preapical antennal seta; L_{pas} 36 (28-46); D_{pd} 158 (149-166); 2 or 3 pedicellar setae ventro-medially; H_{sc} 160-178 (n = 2).

Head. — W_h 572 (548-605); dorsal ocular apodeme absent to weak; epistomal suture moderate medially, weak laterally; IOS/side 3 (2-5); postocular setae in uniserial row running from near postero-ventral margin of eye dorsally to merge with about 4-5 stronger, longer outer verticals; PtOS/side 8-13; inner verticals reaching to about 0.5 of distance from dorso-medial margin of eye to midline of vertex. Clypeus slightly swollen anteriorly, about as wide as long; CS 9 (5-11). Eyes not hairy, microtrichia appearing as minute spikes antero-medially, not visible laterally; dorso-medial margin extending not quite as far mesad as ventro-medial margin; H_e 278 (245-312). $L_{ps_{2\text{-}5}}:W_{ps_{2\text{-}5}}:MaxL_{ps_{2\text{-}5}}$ 92:34:86, 122:36:70, 131:31:64, 186:28:27; D_{so} 10-16 (n = 2); CP 1.10 (1.08-1.14); palpal stoutness 4.04 (3.83-4.28).

THORAX. — L_{th} 1.24 mm (n = 1), D_{th} 1.31 mm (n = 1). Antepronotum with medial commissure strong, reaching not quite to rear margin of phragma I, slightly surpassing anterior margin of scutal process; antepronotal notch right-angled to very obtuse, with medial corners broadly to very broadly rounded and moderately or only scarcely surpassing scutal process; LAS/side 6-7. Postpronotum without setae and apparently without sensilla(?) on antero-dorsal border. Dorsocentrals uniserial; DCS/side 7 (6-9) (n = 3), $MaxL_{dcs}$ 117-158 (n = 2); PAS/side 4-7; scutellar setae dispersed; ScS 18 (8-28) (n = 5), $MaxL_{scs}$ 150-168 (n = 2); ASR 0.65 (n = 2); 1-3 setae on epimeral II protuberance.

WING. — L_w 3.0 (2.8-3.3) mm (n = 4), W_w 0.97 (0.95-1.00) mm (n = 4). Dry wing not available. Slide mounted wing showing: costal projection 81 (65-95) (n = 5) or 4.9 (4.1-5.9) times its width. r-m strong, straight or just slightly and fairly uniformly arched; base of r-m distal to apparent m-cu by 1-4 times width of r-m. M_{1+2} weak; apparent m-cu distal to apparent fCu by about 1-2 times width of apparent m-cu; VR 0.90 (n = 2). Remigium (n = 2) with 1 strong seta on hand, 0(?)-1 weak seta and about 6 campaniform sensilla just beyond wrist, and 2-3 setae and 4 large and about 8 smaller campaniform sensilla on distal 0.5 of forearm. Setae 12, 16 on R (n = 2), 7-20 on R_1 (n = 4) and 1-2 on R_{4+5} (n = 4) (uniserial and dorsal on all). Campaniform sensilla 3 ventrally on Sc just beyond arculus, 2 dorsally on R_1, 1 dorsally and 1 ventrally near base of R_{2+3}, and 1-2 dorsally on R_{4+5}. Squama with 23-45 strong setae, $MaxL_{sqs}$ 135-152.

LEGS. — $L_{p_I}:L_{tot}$ not measurable on slides available; Fe I with sparse postero-dorsal beard of about 5 long setae. Apical spur of Ti I long, slender, with only a few short prickles proximally; L_{tispI} 76-90; apical spurs of Ti II stouter, subequal to equal in length, with fairly numerous prickles on basal 0.5; L_{tispII} 45-57; apical spurs on Ti III with numerous prickles on basal 0.4-0.5; $L_{atispIII}$ 43-52, $L_{ptispIII}$ 71-81. Ti III with posterior comb of about 15-17 spines arranged in a fairly regular single row. Spiniform setae on first 3 tarsomeres of P I-III as follows: 0-3, 2 (apical), 0; 9-11, 3-4, 0; 8-12, 4-6, 0. Lengths and ratios of leg segments as follows (n = 2):

	Fe	Ti	Tm_1	$Tm_{2\text{-}5}$	LR	BV	SV
P_I	1180	1340, 1430	920, 1030	910, 960	0.69, 0.72	3.79, 3.80	2.53, 2.73
P_{II}	1260, 1310	1210, 1280	590, 620	760, 740	0.49	4.04, 4.34	4.16, 4.20
P_{III}	1380, 1460	1390, 1560	890, 1060	890, 990	0.64, 0.68	4.11, 4.12	2.86, 3.11

Hypopygium (without reference to *D. mendotae*). — Fig. 123. Tg IX with 11 (9-14) setae/side. Anal point slender apically, gradually broadening slightly basally, with or without terminal peg; moderate apodemes on underside of Tg IX diverging and arching to antero-lateral corners of Tg IX; L_{gncx} 290-318; L_{tot}:L_{gncx} not measurable. Basal plate weakly developed, with numerous, strong microtrichia ventrally. Medial field well developed, dorsal border weakly delimited; ventro-medial region of medial field strongly produced mesad, this produced region with short, stout setae; distal 0.3 of medial field free, tapering to a point. Aedegal lobes apparently with fine fringe of microtrichia disto-laterally. Gonostylus with subterminal peg and fairly large terminal ridge. Sternapodeme slender, fore margin nearly straight to convex medially. Basal wedge fairly strong, rugose, blunt apically.

Diagnosis. — Antenna plumose, eyes not hairy; the shape of the gonostylus and medial field is similar only to *D. bertrami*, which has hairy eyes.

Material examined. — *Alaska*, Anchorage, 24 Sept. 1964, K. Sommerman, jeep trap, 1 male (USNM); Anchorage, Girdwood Hwy., 9-14 July 1964, K. Sommerman, jeep trap, 1 male (USNM); Palmer, 23 Sept. 1964, K. Sommerman, jeep trap, 1 male (USNM); Seward Hwy., Mud.L.-Kenai L.-Summit L., 20 IX 1965, K. M. Sommerman, jeep trap 65-22, 2 males (USNM); *California*, Mono Co., Sonora Pass, Leavitt Creek, el. 8000′, 18 July 1968, leg. R. Hellenthal, light trap, 1 male (UMn); *Greenland*, Etah, 16 August 1908, Peary's North Pole Expedition, 1908, 1 male (USNM); Tasersauk 15/8/1890 ♂ Lundbeck, type, 1 male (MusCopenhaven) (designated lectotype); *East Greenland*, Jameson Land, 4-14.viii..1933, D. Lack, B. M. 1934-233, 1 male (BMNH); *Wyoming*, 44°57′50″N, 109°29′12″W, alt. 10,300′, 31 mi. N, 21 mi. W of Cody, on rocks in small steep stream feeding Frozen Lake, 13 Aug. 1969, leg. D. Hansen, mature male pupa in silk and sand case, with cast larval skin (UMn); 44°57′42″N, 109°29′00″W, alt. 10,300′, 31 mi. N, 21 mi. W of Cody, drift in small stream feeding Frozen Lake, 12-14 Aug. 1969, leg. D. Hansen, 1 mature male pupa (UMn).

Discussion. — *D. chorea* has an interesting history. Lundbeck described it from Greenland, stating that the species is found in both north and south Greenland. He also noted that "the males can be found in the evening in dancing swarms" (translated). Unfortunately, the species is not recognizable from the description. Lundstroem (1918?) figured the hypopygium of a co-type, but the figure is too sketchy to permit a specific determination. Edwards (1933) did only a slightly better job of illustrating the hypopygium of another co-type, and Pagast (1947) didn't illustrate the hypopygium at all. When I first came across specimens of what I thought was *chorea*, I thought there was a reasonable similarity between Edwards' hypopygial figures of *chorea* and *bertrami*. Serra-Tosio (1971: 147), too, notes that he saw no difference between Edwards' drawing of *chorea* and his own of *bertrami* and suggests that Edwards had possibly confused the two species. As it turns out, *chorea* and *bertrami* have identical hypopygia, although the eyes in *chorea* are "bare" and those in *bertrami* are "hairy." The difference in eye microtrichia length in these two species is quite striking. I am therefore considering *bertrami* and *chorea* as two distinct species separable (in the adult stage) only on the length of eye microtrichia (which doesn't say much for using this character to separate genera).

I collected a mature male pupa with cast larval skin in its pupal case. The case was constructed of fine sand grains and silk and was from a rock in a very small, steep stream above timber line in the Bear Tooth Mountains (Fig. 30). A mature male pupa was also taken in drift from another small stream in the Bear Tooths (Fig. 31).

The specimen recorded from Oregon as *chorea* by Cole and Lovett (1921) has been seen (CalfInsSur through JES). It is a pinned female, and it seems to be a *Potthastia.*

LOCATION OF TYPES. — Dr. S. L. Tuxen kindly loaned me a slide-mounted specimen of one of Lundbeck's original specimens. It is hereby designated as the lectotype and is labelled as such. It is deposited in the Universitetets Zoologiske Museum, Copenhagen.

Diamesa clavata Edwards

D. clavata Edwards, 1933: 615-616 (described from 6 males, 1 female from Akpatok Island, Hudson Strait; figures hypopygium).

Description (unless otherwise stated, n = 1 and measurements are in microns):

HYPOPYGIUM. — Fig. 121. Tg IX with about 12 setae/side. Anal point fairly slender apically, broadening just slightly basally; strong apodemes on underside of Tg IX diverging and arching to antero-lateral corners of Tg IX. Basal plate well developed, with numerous strong microtrichia ventrally. Medial field well developed, with distal end free. Gonostylus expanded distally, with subterminal peg and strong terminal ridge. Sternapodeme fairly broad medially, slightly produced antero-laterally. Basal wedge fairly strong, blunt apically.

DIAGNOSIS. — Antenna plumose, eyes hairy; basimedial setal cluster absent; medial field well developed; gonostylus somewhat club-shaped. The gonostylus is distinctive.

MATERIAL EXAMINED. — [*North West Territories*], Fly'g over and near stream, valley head, A. K. Gregson, 3 Sept. 1931, O. U. Exp. 1931, S. Akpatok I., Ungava Bay, N. Canada, A. K. Gregson d.d 1931, *Diamesa clavata* Eds., Det. in B. M., F. W. Edwards May 1933, 1 paratype male (Oxford); Damp cleft, gorge cliff, 24 Aug. 1931, O. U. Exp. 1931, SE Akpatok I., Ungava Bay, N. Canada, D. H. S. Davis d.d 1931, *Diamesa clavata* Eds., Det. in B. M., F. W. Edwards May 1933, 1 paratype male (Oxford).

Discussion. — Through the kindness of Dr. G. C. Varley and Mr. E. Taylor, I was able to borrow two paratype males of *D. clavata*. The Oxford Museum preferred that the specimens not be slide mounted, so I simply clipped and cleared the hypopygium and made a temporary glycerine mount of it for the drawing. I could make little note of other characters and have therefore described only the hypopygium.

The gonostylus is unlike any other described species, so determination of this species should be simple.

Location of types. — Holotype and 5 other males are at the Oxford University Museum, Hope Department of Entomology. I saw two of Edwards' specimens.

Diamesa colenae new species

Description (unless otherwise stated, n = 4 and measurements are in microns): as in *D. mendotae* except:

Total length. — 3.8 (3.3-4.1) mm (n = 3) (uncleared alcohol specimens).

Coloration. — not noted.

Antenna (n = 2). — longest flagellar seta 0.65 L_{fl}. Flm_{13} with apical 0.24 spindle-shaped, mainly swollen ventrally; 2-3 short, slender setae dorso- and ventromedially on Flm_1; long (MaxL 859-900) flagellar setae difficult to count on slides available; setae on basal 0.1-0.2 of spindle-shaped region of Flm_{13}; $\overline{L_{flm_{1-13}}:W_{flm_{1-13}}}$ 96:55, 23:48, 27:45, 31:44, 30:40, 34:39, 34:38, 41:35, 41:33, 40:32, 44:32, 826:32; AR 1.56, 1.60; 1 preapical antennal seta, L_{pas} 26, 42; D_{pd} 188; 2-5 pedicellar setae ventro-medially; H_{sc} 203 (188-222) (n = 4).

Head. — W_h 679 (654-728); dorsal ocular apodeme nearly absent to weak but fairly long; epistomal suture (in mature specimens) moderate medially, weak laterally; IOS/side 4.4 (3-6); PtOS/side 10-14; inner verticals reaching to 0.47-0.56 of distance from dorsomedial margin of eye to midline of vertex. Clypeus slightly swollen anteriorly, about as wide as long; CS 17 (13-21) (n = 4). Eyes not hairy, microtrichia visible as minute points antero-medially, not visible laterally; H_e 294, 335 (n = 2); $\overline{L_{ps_{2-5}}:W_{ps_{2-5}}:MaxL_{pss_{2-5}}}$ 114:40:109, 170:46:97, 170:38:94, 227:33:? (n = 2); D_{so} 17 (16-20); CP 0.99, 1.01 (n = 2); palpal stoutness 4.31, 4.50 (n = 2).

Thorax. — L_{th} 1.31 (1.28-1.36) mm (n = 3), D_{th} 1.28 (1.22-1.33) mm (n = 3). Antepronotum with medial commissure strong, not reaching rear margin of phragma I, reaching to or slightly surpassing anterior margin of scutal process; antepronotal notch varying from right angled, with rounded corners extending well beyond scutal process, to shallow and very obtuse, with medial corners very broadly rounded and scarcely extending beyond scutal process; LAS/side 7-9. Scutal process weak; dorsocentrals uniserial to slightly staggered posteriorly; DCS/side 12 (10-14) (n = 4), $MaxL_{dcs}$ 149-178 (n = 3); PAS/side 9 (6-10); scutellar setae roughly in 2 long posterior and 1 short anterior row; ScS 34 (30-36), MaxL not measurable on slides available. ASR 0.61-0.66 (n = 3); 3-7 setae on epimeral II protuberance.

Wing. — L_w 3.6 (3.4-3.8) mm, W_w 1.13 (1.02-1.22) mm. Dry wing not available. Slide mounted wing showing: costal projection 122 (83-149) or 7.1 (5.3-9.4) times its width. M_{1+2} weak. Remigium with 1-2 strong or 1 strong and 1 or 2 weaker setae on hand, 1 or 2 weak setae and about 8-14 campaniform sensilla just beyond wrist, and 2-3 setae and 4 large and about 8-12 smaller campaniform sensilla on distal 0.5 of forearm. Setae 17 (13-21) on R, 11 (9-14) on R_1, 5 (3-8) on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 3 ventrally on Sc just beyond arculus, 2-3 dorsally on R_1, 1 dorsally and 1 ventrally near base of R_{2+3}, and 2-4 dorsally on R_{4+5}. Squama with 47-66 strong setae, $MaxL_{sqs}$ 154-198.

LEGS. — (n = 2). $L_{p_I}:L_{tot}$ not measurable in slides available. Fe I with sparse postero-dorsal beard of about 7-8 long setae. Apical spur of Ti I long, slender, with sparse prickles on basal 0.3; apical spurs otherwise as in *D. mendotae*. Spiniform setae on first 3 tarsomeres of P I-III as follows, 2 (apical)-3, 2 (apical), 0; 14, 3-4, 0; 17-20, 7-10, 0. Lengths and ratios of leg segments as follows:

	Fe	Ti	Tm_1	Tm_{2-5}	LR	BV	SV
P_I	1480, 1600	1720, 1900	1190, 1380	1210, 1330	0.69, 0.73	3.63, 3.67	2.53, 2.68
P_{II}	1700, 1720	1600, 1720	760, 890	870, 1010	0.47, 0.52	4.30, 4.63	3.87, 4.36
P_{III}	1860, 1930	1860, 1990	1130, 1460	1180, 1340	0.61, 0.73	4.01, 4.20	2.68, 3.30

HYPOPYGIUM (without reference to *D. mendotae*). — Fig. 122. Tg IX with 16 (12-20) setae/side. Anal point strong, distinctly broadening basally, with short distal keel and small apical peg; strong apodemes on underside of Tg IX fairly straight, diverging and running towards antero-lateral corners of Tg IX; L_{gncx} 388 (365-402); $L_{tot}:L_{gncx}$ 10. Basal plate fairly well developed, slender and quite long, with numerous strong microtrichia ventrally. Medial field well developed, dorsal border rugose, not sharply delimited; medial field with numerous microtrichia, except antero-dorsally, and with numerous setae, particularly antero-ventrally; distal 0.3 of medial field free; medial field with about 6-8 setae in proximo-dorsal corner. Gonostylus slender, with subterminal peg and very short terminal ridge. Sternapodeme slender medially, fore margin straight medially, without antero-lateral projections. Basal wedge fairly strong, triangular, rugose.

DIAGNOSIS. — Antenna plumose, eyes not hairy; basal plate long, slender; medial field long, slender, with free distal end; gonostylus slender. The hypopygial characters are quite distinct.

MATERIAL EXAMINED. — *Alaska*, Anchorage, 24 Sept. 1964, K. Sommerman, jeep trap, 1 male (USNM); *Wyoming*, 44°17'N, 106°57'W, South Fork Campground, 12 mi. W, 5 mi. S of Buffalo, attracted to illuminated sheet by Clear Creek, 23 Aug. 1967, leg. D. Hansen, 1 male (holotype); *Yukon Territory*, Whitehorse, 12.VII.49, L. R. Pickering, 10 males (CNC).

DISCUSSION. — I have collected this species only once; it was attracted to a white sheet hung behind a lantern by a stream. The species is named in honor of my wife, who assisted me very much on our collecting trips and throughout my thesis work.

LOCATION OF TYPES. — The holotype is the specimen I collected in Wyoming. It is slide mounted and is deposited in the collection of the Department of Entomology, University of Minnesota, St. Paul, Minnesota. The other specimens examined are designated as paratypes and are returned to their institutions.

Diamesa coquilletti Sublette

Eutanypus borealis Coquillett, 1899: 341-342 (described from 1 male, 1 female from Bering Island, 1 female from Mt. Washington, New Hampshire); Johannsen, 1952: 13 (as junior synonym to *D. nivoriunda* (Fitch)); Sublette and Sublette, 1965: 152 (as junior synonym to *D. nivoriunda* (Fitch)).

[*non*] *Eutanypus borealis* Coq. Coquillett, 1900: 396 (records "a single specimen" from Muir Inlet, Alaska; misdetermination); Cockerell, 1900: 439 (records from New Mexico; misdetermination of *D. heteropus* (Coq.)).

Diamesa coquilletti Sublette, 1966: 584-585 (as new name for *Eu. borealis* Coq.; preoccupied by *borealis* Kieffer, 1915).

Description (unless otherwise stated, n = 1 and measurements are in microns): as in *D. nivicavernicola* except:

TOTAL LENGTH. — 5.6 mm.

COLORATION. — not noted before slide mounting.

ANTENNA. — Fig. 41. 8 flagellomeres, with no partial fusion of flagellomeres; non-plumose, longest flagellar seta (on $Flm_{5\ \&\ 7}$) $0.23L_{fl}$; Flm_1 slightly fusiform, with very weak basal nipple; $Flm_{2\text{-}7}$ fusiform, Flm_8 with basal 0.7 cylindrical, apical 0.3 slightly tapering distally; flagellar setae short (MaxL 137), setae 1 on Flm_1, 2 on Flm_2, 3 on $Flm_{3\ \&\ 4}$, 5 on $Flm_{5\text{-}7}$, 1 on Flm_8; single seta at 0.8 of Flm_1 and 0.15 of Flm_8, setae basically in single irregular whorl/flagellomere on $Flm_{2\text{-}7}$; setal whorl at about 0.5 of $Flm_{2\text{-}7}$. Antennal sensilla as follows: large, blunt sensillum basiconicum 1 on $Flm_{1\text{-}5}$; slightly smaller, blunt sensilla basiconica 1 on Flm_1, 2 on Flm_2 (these sensilla on $Flm_{1\ \&\ 2}$ only slightly smaller than the large, blunt sensilla basiconica), 1 on $Flm_{3\text{-}5}$, apparently about 4 on Flm_8 (slightly shorter, blunter, less curved than the numerous long, pointed sensilla basiconica); long, pointed sensilla basiconica 2 on $Flm_{6\ \&\ 7}$, numerous on Flm_8; ringed sensilla coeloconica 2 on $Flm_{1\ \&\ 2}$, 5 on Flm_8; small sensilla coeloconica 2 on Flm_1, 1 on $Flm_{2\ \&\ 3}$, 5 near apex of Flm_8. $\overline{L_{flm_{1\text{-}8}} : W_{flm_{1\text{-}8}}}$ 105:50, 50:42, 65:34, 55:32, 50:34, 44:34, 44:34, 166:32; AR 0.38; 1 preapical antennal seta; L_{pas} about 40; D_{pd} 119; 2 pedicellar setae ventro-medially; scape slightly reduced, with distinct articulation to antennifer ventro-laterally and to pedicel ventro-medially; H_{sc} 125; dorsal or dorso-medial region of scape slightly weaker than remainder.

HEAD. — W_h 663; coronal suture strong, ending about at level of mid-point of scapes, bifurcating on dorsal region of vertex, with strong coronal apodeme; vertex just slightly sunken at arms of coronal suture; rear margin of coronal triangle produced just slightly dorsad at midline to form very small, weak nape; vertex medially produced towards but not clearly reaching to and fusing with frons, poorly sclerotized between antennal sockets; vertex moderately projecting over dorso-medial region of each scape; dorsal ocular apodeme absent; reduced ocelli faint, not widely separated, just above projections over scapes; epistomal suture weak medially and laterally; interocular setae at about 0.7 of distance from dorso-medial margin of eye to midline of vertex; IOS/side 1; PtOS/side 13; inner vertical setae not well differentiated from outer verticals, the more dorsal and medial ones being more curved and decumbent, not quite reaching arms of coronal suture dorsally or reaching to 0.56 of distance from dorso-medial margin of eye to midline of vertex. Clypeus slightly swollen anteriorly, wider than long; CS 5. Tentorium slightly swollen antero-laterally just dorsal to its base, not produced postero-medially; tentorium extending slightly beyond PTP. Eyes with dorso-medial margin rounded; H_e 286; ventral ocular apodeme very short, weak; antero-ventral margin of eye not contacting tentorium. PS_1 without setae, roughly globose, slightly less well sclerotized than other palpal segments; distal 0.6 of PS_2 slightly swollen laterally, PS_{3-5} basically cylindrical; $\overline{L_{ps}}_{2-5}$: $\overline{W_{ps}}_{2-5}$: $\overline{MaxL_{pss}}_{2-5}$ 91:53:75, 115:51:73, 137:42:44, 186:34:46; sunken organ prominent, at 0.8 of PS_3; D_{so} 20; CP 1.23; palpal stoutness 3.00. Cibarial plate about as wide as long, slightly tapering dorsally, with fairly long, tapering cornua. Stipes strong only laterally.

THORAX. — L_{th} 1.56 mm, D_{th} 1.34 mm. Antepronotum with medial commissure reaching only about 0.4 of distance to rear margin of phragma I, reaching to but not surpassing fore margin of scutum; antepronotal notch acute; medial corners rounded, well surpassing anterior margin of scutum; anterior margin of antepronotum straight, not concave antero-laterally; LAS/side 21. Scutum in side view slightly flattened, gently indented approximately above parapsidal suture but not extending anteriorly beyond fore margin of antepronotum. Dorsocentrals uniserial medially and posteriorly, slightly staggered anteriorly; DCS/side 13, 14, $MaxL_{dcs}$ 174. Prealar setae roughly in 1 long, staggered, dorsal and 1 shorter, staggered, ventral row on postero-dorsal region of prealar callus; PAS/side 11; humeral scar a small, tuberose area anterior to dorsal end of parapsidal suture; medial scutal scar not visible in slide available. Scutellar setae roughly in 3 long (posterior) and 1 short (anterior) row; ScS 49, $MaxL_{scs}$ 131. Postnotum with medial cleft reaching to near moderately sharp postero-dorsal corner, with suture on midline postero-ventrally. Anteanepisternal pit ill-defined ventrally; ASR 0.58; 0 setae on epimeral II protuberance, epimeral II protuberance well developed.

WING. — L_w 3.3 mm, W_w not measurable. Wings not fully expanded, so outline indeterminable. Rear margin apparently just slightly concave proximally, anal lobe apparently about right angled. Dry wing not available. Slide mounted wing showing: costal projection apparently about 2 times its width; R_1 apparently not swollen distally; R_{2+3} fairly strong proximally, fading to merely a fold beyond about 0.5 its length, running about midway between R_1 and R_{4+5}; r-m strong, moderately arched; base of r-m scarcely at all distal to apparent m-cu; apparent m-cu distal to apparent fCu by about 3 times width of apparent m-cu; VR 0.95. Remigium with 1 (at least) seta on hand, 2 setae and about 15 campaniform sensilla just beyond wrist, and 4 setae and 3 large and ? smaller campaniform sensilla on distal 0.5 of forearm. Setae 24 on R, 14 on R_1, and 25 on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla not visible on Sc, 0(?) on R_1, 1 dorsally and 1 ventrally near base of R_{2+3}, and about 4 dorsally on R_{4+5}. Squama with about (difficult to count) 34 setae, $MaxL_{sqs}$ not measurable.

LEG. — Only femur and tibia of hind leg present; L_{feIII} 2370, L_{tiIII} 2370; $L_{ptispIII}$ 57; comb of Ti III with 19 spines in regular single row.

HYPOPYGIUM (without reference to *D. nivicavernicola*). — Fig. 140. Tg IX with 15, 17 setae/side. Anal point short, slender apically, broadening basally, without apical peg; weak apodemes on underside of Tg IX diverging from base of anal point (difficult to see in slide available); L_{gnex} 548; L_{tot}:L_{gnex} 9. Basal plate apparently well developed. Medial field well developed, dorsal border apparently weak; medial field with microtrichia distally and ventrally, with short, strong setae ventrally; distal 0.2 of medial field slender, free, curving slightly mesad. Gonostylus broadest at 0.3 its length, decreasing abruptly in width, distal 0.5 slender; gonostylus with subterminal peg but apparently without terminal ridge. Sternapodeme fairly broad medially, without antero-lateral projections; fore margin roughly straight. Basal wedge long, strong, rugose.

DIAGNOSIS. — Antenna with 8 flagellomeres; anal point strong; medial field with free distal end. The hypopygium is quite like the European *D. cinerella* (Fig. 141); *cinerella,* however, has 13 flagellomeres.

MATERIAL EXAMINED. — Bering Island, July-Aug 1897, L. Stejneger, Allotype No. 4047, USNM, allotype male (USNM).

DISCUSSION. — Coquillett (1899) described this species as *Eutanypus borealis* n. gen., n. sp., with a female as the type. "An immature male specimen" from the same locality was also mentioned, and Coquillett further states that a female from Mt. Washington, New Hampshire, was indistinguishable from the Bering Island female. I doubt very much, however, that the specimen from Mt. Washington is actually *D. coquilletti.* A year later Coquillett (1900) recorded the species from Alaska. I saw this specimen (it bore no determination label) in material borrowed from the USNM. It is a female *Diamesa,* but it has bare eyes, so it could not be *coquilletti.* I also saw an undetermined specimen from the USNM labelled "Las Vegas, NM, Cockerell, Collector"; it is a male *D. heteropus* and is possibly the specimen recorded by Cockerell (1900) as *Eutanypus borealis* from New Mexico.

Sublette (1966) recognized his (Sublette and Sublette, 1965) and Johannesen's (1952) earlier incorrect synonymizing of *coquilletti* with *D. nivoriunda.* Sublette (1966) renamed the species in honor of Coquillett (the name is preoccupied by *borealis* Kieffer, 1915) and stated that it most closely resembled *insignipes* Kieffer and *cinerella* Meigen. I don't feel that it shows much similarity to *insignipes,* but it is obviously close to *cinerella* (cf. Figs. 140, 141) and to *ursus* Kieffer (Serra-Tosio, 1971: Pls. 98, 99).

The hypopygium had been slide-mounted, but unfortunately it had been excessively cleared and slightly flattened. I therefore could only show the more gross features in my figure. I slide mounted the remainder of the male specimen.

The species was collected on Bering Island, one of the Commander Islands, by Dr. L. Stejneger. Bering Island is slightly less than 100 miles from Cape Kamchatka, USSR (Bering Island = 0. Beringa of the Komandorskiye Ostrova, Bartholomew, J., *ed.*, 1959. The Times Atlas of the World. Vol. II. Houghton Mifflin, Boston), and it is in the Paleartic, not the Nearctic. I didn't realize this until the final stages of this study, so I shall still include *coquilletti* here. It is a palearctic species, however.

LOCATION OF TYPE. — Holotype female and allotype male are at the USNM. I examined the allotype male.

Diamesa davisi Edwards

[?] *D. ursus* Kieffer. Edwards, 1922: 211-212, Fig. 11 (records 3 females from Bear Island; determination questioned by Saether, 1968: 441).

D. davisi Edwards, 1933: 614-615, Fig. 2a (described from 3 males, 1 female from Akpatok Island, Hudson Strait; figures hypopygium).

[*non*] *D. davisi* Edw. Thienemann, 1941: 78; Tabelle 20; 148, 189 (records adults from Swedish Lappland, Norway, and Greenland; records but does not describe pupa); Pagast, 1947: 477-478, 525-526, 573 (description of adult male, male pupa); Thienemann, 1954: 346 (mention of earlier (Thienemann, 1941) records); Saether, 1968: 430, 440, 441-445, 447, 448, 449, 453, 456, 472, 473, 475, 476, 477, 478 (description of larva, pupa, adult from Norway; ecology; zoogeography); Serra-Tosio, 1969: 205, 206 (records from Swedish Lappland, from Brundin collection; questions Thienemann's (1941: 148) records from Greenland); Serra-Tosio, 1971: 195-198, Pls. 82, 155 (description of adult male); Steffan, 1971: 477-478, 483 (records from Northern Scandinavia; ecology in glacial brooks).

Description (unless otherwise stated, n = 5 and measurements are in microns): as in *D. amplexivirilia* except:

TOTAL LENGTH. — 3.2 (3.0-3.4) mm (n = 4).

COLORATION. — not noted.

ANTENNA. — 8 flagellomeres, rarely with partial fusion of $Flm_{2\,\&\,3}$; non-plumose, longest flagellar seta (on Flm_7) $0.14\text{-}0.16L_{fl}$; $Flm_{2\text{-}7}$ slightly to moderately fusiform; flagellar setae short (MaxL 56-78), setae 4-6, 3-4, 1-2, 0-1, 1-3, 0, 4-6, 3-4 on $Flm_{1\text{-}8}$, respectively. Antennal sensilla as follows (n = 3): large, blunt sensillum basiconicum 1 on $Flm_{1\text{-}5}$; smaller, blunt sensillum basiconicum 0-1 on Flm_1, 1 on Flm_2, 2 on Flm_3, 2-4 on $Flm_{4\text{-}5}$, about 3-6 on Flm_6, 0-2 on Flm_7; long, pointed sensilla basiconica 0-2 on Flm_5, 2-4 on Flm_6, 15-about 19 on Flm_7, numerous on Flm_8; ringed sensilla coeloconica 1 dorsal, 1 ventral on Flm_1, 1 dorsal on Flm_2, occasionally 1 on Flm_7, 5-7 on Flm_8; small sensilla coeloconica 2 on Flm_1, 1-2 on Flm_2, 1 on Flm_3, 3-4 near tip of Flm_8. $\overline{L}_{flm_{1\text{-}8}} : \overline{W}_{flm_{1\text{-}8}}$ 98:35, 46:33, 37:31, 29:27, 30:29, 25:28, 39:34, 114:37; AR 0.36 (0.31-0.40); 2 or occasionally 3 weak, curved preapical antennal setae; L_{pas} 24 (20-27); D_{pd} 66 (61-76); pedicellar setae absent; H_{sc} 59 (53-66).

HEAD. — W_h 429 (393-464); coronal suture moderate, ending between top of antennal foramina and lower end of vertex projections over scapes, bifurcating on dorsal region of vertex, with moderate internal apodeme; reduced ocelli very far apart, just above to well above level of tops of antennal sockets; epistomal suture moderate medially, slightly weaker laterally, reaching ATP's; interocular setae easily distinguishable from inner verticals, at or in pair centered at 0.4-0.6 of distance from dorso-medial margin of eye to midline of vertex; IOS/side 1-2; inner verticals not or only occasionally occurring below dorsal margin of eye anteriorly, reaching only 0.33 (0.29-0.36) of distance from dorso-medial margin of eye to midline of vertex; clypeal setae widely separated, located dorso-laterally; CS 2 (0-4). Tentorium not to moderately extending beyond PTP. H_e 215 (203-237). $\overline{L_{ps_{2-5}}:W_{ps_{2-5}}:MaxL_{pss_{2-5}}}$ 63:40:49, 99:46:43, 81:38:30, 120:32:17; D_{so} 20 (16-28); CP 1.17 (1.11-1.22); palpal stoutness 2.39 (2.12-2.69). Cibarial plate about as high as wide, sides straight or slightly concave, cornua fairly long, slender, slightly arched.

THORAX. — L_{th} 0.89 (0.82-0.94) mm, D_{th} 0.89 (0.75-1.04) mm. Antepronotum apparently without medial commissure (n = 2); antepronotal notch weak, obtuse, apex well behind fore margin of scutum; medial corners broadly rounded, not or only slightly surpassing anterior margin of scutum; LAS/side 10 (about 6-about 15). DCS/side 7 (5-9), $MaxL_{dcs}$ 82 (69-93). Prealar setae confined to postero-dorsal region of prealar callus; PAS/side 3 (2-5); humeral scar a group of 2-5 tubercles anterior to dorsal 0.2 of parapsidal suture. Scutellar setae roughly in 3 rows; ScS about 19 (about 11-30), $MaxL_{scs}$ 89 (75-105). Anteanepisternal pit a small, well to poorly defined oval; medioanepisternum II not completely delimited ventrally, ventral region narrowed, somewhat pointed; ASR 0.54 (0.50-0.56); 0-3 setae on epimeral II protuberance, which is fairly well developed; no setae on epimeron II just below protuberance; 1-2 preepisternal II setae occasionally present just below anapleural suture.

WING. — L_w 2.35 (2.10-2.60) mm, W_w 0.86 (0.73-0.99) mm. Outline about as in Fig. 99. Wing margin usually slightly concave at about 0.5 and just beyond tip of R_1 and at tip of M_{3+4}, straight or just slightly concave just distal to anal lobe; anal lobe quite obtuse. Costal projection 34 (16-50) or 1.6 (0.7-2.5) times its width; vestige of ?R_5 appearing as faint diffuse band just anterior to distal 0.3 of M_{1+2}; vestige of ?M_2 appearing as faint diffuse band just posterior to distal 0.6 of M_{1+2}; VR 0.95 (0.91-1.0). Remigium with 1 or 2 strong setae on hand, 0-1 weak seta and 7-about 12 campaniform sensilla just beyond wrist, and 2-3 setae and 4 large and 4-6 smaller campaniform sensilla on distal 0.5 of forearm. Setae 1-5 on R, 6-9 on R_1, and 7 (4-11) on R_{4+5} (uniserial and dorsal on all) (1 specimen with 1 seta on base of r-m). Campaniform sensilla 0(?)-3 ventrally on Sc just beyond arculus, rarely 1 dorsally on R, 2 on R_1, 1 dorsally near base of R_{2+3}, and 2 (1-4) dorsally on R_{4+5}. Squama with 17 (10-23) setae, $MaxL_{sqs}$ 68 (59-75) (n = 3).

LEGS. — $\overline{L_{p_I}:L_{tot}}$ 1.51. Apical spur of Ti I rather short, slightly expanded basally, with somewhat sparse to fairly numerous prickles on basal 0.5-0.6; $L_{ti\text{-}pI}$ 33-43; apical spurs of Ti II stouter, subequal, with basal 0.6-0.8 enlarged and bearing fairly numerous prickles; L_{tispII} 31-50; $L_{atispIII}$ 31-43, $L_{ptispIII}$ 60-74. Spiniform setae on first 3 tarsomeres of P I-III as follows: 2 (apical), 2 (apical), 2 (apical); 5-9, 3-4, 2-3; 16-23, 7-9, 3-4. Tm_4 slightly less cordiform than in *D. mendotae*, with dorso-lateral region only moderately constricted just before apex. Lengths and ratios of leg segments as follows:

	Fe	Ti	Tm_1	Tm_{2-5}	LR	BV	SV
P_I	1570 (1340–1790)	1460 (1260–1610)	920 (790–1010)	890 (770–1000)	0.64 (0.61–0.66)	4.45 (4.17–4.73)	3.27 (3.05–3.44)
P_{II}	1580 (1360–1790)	1310 (1130–1460)	620 (550–710)	660 (570–720)	0.47 (0.43–0.51)	5.36 (4.88–5.92)	4.70 (4.28–5.23)
P_{III}	1680 (1450–1890)	1530 (1310–1660)	1000 (870–1090)	980 (820–1080)	0.65 (0.63–0.67)	4.29 (4.12–4.41)	3.22 (3.10–3.41)

HYPOPYGIUM (without reference to *D. amplexivirilia*). — Fig. 120. Tg IX with 0(?)-about 8 very weak setae/side; St IX with dorso-lateral region slightly produced along side of gonocoxite; projection with several short setae. Anal point absent or only very short, weak, and directed ventrad and only visible in lateral view; apodemes on underside of Tg IX fairly strong, roughly "Y"-shaped. L_{gncx} 335 (281-440), $\bar{L}_{tot}$:$\bar{L}_{gncx}$ 9. Basal plate fairly well developed, forming a microtrichia and seta-bearing flap-like projection from disto-medial margin of basal foramen. Medial field not developed. Gonostylus broad basally, tapering towards apex, with subterminal peg and toothed terminal ridge. Sternapodeme strongly produced and pointed antero-medially. Basal wedge small, rugose.

DIAGNOSIS. — St IX slightly produced along gonocoxites, anal point absent or very weak, gonostylus fairly evenly tapering distally and usually with distinct terminal teeth. *D. amplexivirilia* is the most similar species but is easily separable with the above hypopygial characters. *D. leona* and *leoniella* lack the terminal teeth and have a "pile" on the medial surface of the gonostylus.

MATERIAL EXAMINED. — *Alaska*, Anchorage, 9 Sept. 1964, K. Sommerman, jeep trap, 1 male (USNM); Anchorage-Eagle R.-L.SusitnaR., 22 Sept. 1966, K. M. Sommerman, jeep trap 66-50, 1 male (USNM); Anchorage-Granite Creek, 8 Sept. 1966, K. M. Sommerman, jeep trap 66-47, 4 males (USNM); Anchorage, Girdwood Hwy. 9-14 July 1964, K. Sommerman, jeep trap, 1 male (USNM); Kenai Pen., Seward-Primrose CG, 17 June 1965, KMSommerman, jeep trap, 1 male (USNM): Matanuska, Eklutna Hwy., 22 June 1964, K. M. Sommerman, jeep trap, 1 male (USNM); Palmer, 23 Sept. 1964, K. Sommerman, jeep trap, 3 males (USNM); Seward Hwy., Mud L.-Kenai L.-Summit L., 20 IX 1965, K. M. Sommerman, jeep trap 65-22, 7 males (USNM); Seward Hwy., Mud L-Summit L. Ldge., 2 Sept. 1965, KMSommerman, jeep trap 65-20, 65-18, 8 males (USNM); Seward Hwy., Summit L., 2 IX 1965, K M Sommerman, jeep trap, 5 males (USNM); Seward Hwy., Summit L.-Portage Glacier, 3 IX 1965 K M Sommerman, jeep trap 65-21, 2 males (USNM); *California*, Mono County, Sonora Pass, Leavitt Creek, 8,000′, 18 July 1968, leg. Ronald A. Hellenthal, 1 male (UMn); *Montana,* Ft. Peck reservoir, downstream camp over stream, 25 July 1968, leg. Ronald A. Hellenthal, 1 male (UMn); Going to the Sun Hgwy and Logan Ck., light trap, 5,800′, 23 July 1968, Glacier Natl. Park, leg. R. Hellenthal, 13 males (UMn); as above, but drift trap in Logan Creek, 10 males (UMn); *New Hampshire,* Mt. Washington, Ammonoosuc River, 16.VI.1967, leg. D. R. Oliver, DRO 40-13-1, 3 males, 2 pupal exuviae (CNC); [*North West Territories*], Boulders in watercourse, 21 Aug. 1931, O. U. Exp. 1931, S. E. Akpatok I., Ungava Bay, N. Canada, D. H. S. Davis, dd. 1931, det. in BM. F. W. Edwards, May 1933, 1 paratype male (Oxford); *Utah.* Salt Lake County, Big Cottonwood Canyon, mine drain north of road across from Cardiff Fork, leg. A. V. Nebeker, 24 Nov. 1964, 1 male (ANSP); Salt Lake County, Big Cottonwood Creek ½ mile below Mineral Fork, leg. A. V. Nebeker, 12 Dec. 1964, 1 male (ANSP); Salt Lake County, Big Cottonwood Creek ½ mile below Cardiff Fork, leg. A. V. Nebeker, 2 Dec. 1964, 1 male (ANSP); *Washington,* 4 mi. E, 6 mi. S of Glacier, sweeping by meltwater streams by Roosevelt Glacier on Mt. Baker, 4 Sept. 1967, leg. D. Hansen, 3 males (UMn); 3 mi. E, 6 mi. S of Glacier, on rocks in meltwater stream at timberline, Mt. Baker, 7 Sept. 1967, leg. D. Hansen, 4 males (UMn); *Wyoming,* 41°20′N, 106°10′W, 3 mi. NNW of Centennial, by Nash Fork of Little Laramie River, 23 March 1968, leg. D. Hansen, 1 male (UMn); 44°57′42″N, 109°29′00″W, alt. 10,300′, 31 mi. N, 21 mi. W of Cody, under rocks in small rocky stream feeding Frozen Lake, 11, 13 Aug. 1969, leg. D. Hansen, 12 males (UMn); 44°58′26″N, 109°33′12″W, alt. 9,640′, 32 mi. N, 24 mi. W of Cody, on rocks (often congregating) in small stream feeding unnamed lake, water 14°C., 9 Aug. 1969, leg. D. Hansen, 3 males (UMn).

DISCUSSION. — Edwards (1933) described *davisi* from specimens collected by an Oxford University expedition to Akpatok Island in Hudson Strait. The species has not been recorded from the Nearctic since then, although several European workers have described or recorded a species as *"davisi"* from Scandinavia. As discussed below, I do not feel the European species is actually *davisi.*

Thienemann (1941: 189) recorded *"davisi"* from 2 males, a male pupal exuviae, and a male pupa from Abisko, Swedish Lappland. He also stated that the species had been taken at Finse, Norway, and Greenland; neither Serra-Tosio (1971: 197) nor I know how Thienemann (l.c.) got the Greenland record. Pagast (1947: 477-8, Abb. 35-39) described *"davisi"* from the specimens collected by Thienemann. Pagast (l.c.) illustrates the entire hypopygium, the gonostylus, and the anal point, and it seems to me that he was seeing not *davisi* but an undescribed species near *davisi.* The figure by Serra-Tosio (1971: Pl. 82) is like that of Pagast (l.c.). I do not feel that the European species described by Pagast (l.c.) and Serra-Tosio (l.c.) is actually *davisi;* it seems, instead, to be a new species between *amplexivirilia* and what I am calling *davisi.* The ninth sternite in Serra-Tosio's (l.c.) and Pagast's (l.c.) figures approaches the development of that in *amplexivirilia,* and the gonostylus is also more narrowed at about half its length than in my nearctic specimens of *davisi* (cf. Serra-Tosio, l.c.; Pagast, l.c.; and my Fig. 120). The figure by Saether (1968: Fig. 17c) is of a male prepared from a mature pupa and is not clear enough to compare with other figures.

Near the end of my study I came across specimens of probably two new nearctic species very close to *davisi.* They differ from *davisi* in the shape of the lateral extensions of the ninth sternite and in the shape of the gonostylus. I found them too late to include here, but if we can carefully compare a paratype of *davisi,* the european "*davisi,*" the specimens I am calling *davisi,* and these additional species, we will be able to apply the name *davisi* correctly and name and describe the related species.

LOCATION OF TYPES. — Paratypes are at Oxford University; I am not certain, but the holotype is either there or at the BMNH.

Diamesa garretti Sublette and Sublette

D. borealis Garrett, 1925: 6 (described from numerous males and females from British Columbia).

D. garretti Sublette and Sublette, 1965: 151 (as new name for *D. borealis* Garrett; preoccupied by *borealis* Kieffer, 1915); Sublette, 1967a: 296-299, Fig. 2 (lectotype designation; figures hypopygium); Sublette, 1970: 44-46, Fig. 1 (description).

Description (unless otherwise stated, n = 5 and measurements are in microns): as in *D. mendotae* except:

TOTAL LENGTH. — 5.2-5.7 mm (n = 3).

COLORATION (pinned specimen). — capitellum and distal 0.5 of haltere shaft pale white.

ANTENNA. — longest flagellar seta 0.65 (0.63-0.69)L_{fl}; Flm_{13} with apical 0.19-0.22 spindle-shaped, mainly swollen ventrally; 2-5 short, slender setae dorso- and ventro-medially on Flm_1; long (MaxL 900-1000) flagellar setae 1 on Flm_1, 2-3 on Flm_2, 6-8 on Flm_3, 8-10 on Flm_4, increasing to 13-15 on Flm_{12}, numerous on Flm_{13}; setae not on or only on basal 0.1-0.3 of spindle-shaped region of Flm_{13}; $\overline{L}_{flm_{1-13}} : \overline{W}_{flm_{1-13}}$ 101:61, 23:50, 26:49, 31:46, 30:44, 30:42, 30:41, 32:41, 35:39, 37:39, 39:38, 42:37, 955:36; AR 1.85 (1.67-1.98); 1 preapical antennal seta, L_{pas} 38 (34-44); D_{pd} 199 (183-215); 2-3 pedicellar setae ventro-medially; H_{sc} 217 (210-222).

HEAD. — W_h 721 (676-748); dorsal ocular apodeme weak; epistomal suture ranging from strong its entire length to moderate medially and weak laterally; IOS/side 4 (2-5); PtOS/side 13-18; inner verticals reaching to 0.64 (0.60-0.68) of distance from dorso-medial margin of eye to midline of vertex. Clypeus moderately swollen anteriorly, as long as or slightly longer than wide; CS 16 (12-21). Eyes not hairy, microtrichia visible antero-medially as minute points, not visible laterally; dorso-medial margin extending not quite as far mesad as ventro-medial margin; H_e 336 (312-350). $\overline{L}_{ps_{2-5}} : \overline{W}_{ps_{2-5}} : \overline{MaxL}_{pss_{2-5}}$ 121:39:95, 178:46:85, 180:37:57, 262:31:32; CP 0.95 (0.88-1.01); palpal stoutness 4.92 (4.73-5.12).

THORAX. — L_{th} 1.50 (1.39-1.60) mm, D_{th} 1.48 (1.44-1.53) mm. Antepronotum with medial commissure strong, not quite reaching rear margin of phragma I, reaching to or slightly surpassing anterior margin of scutal process; antepronotal notch about right-angled, with medial corners rounded and well surpassing scutal process; LAS/side 9 (6-15); postpronotum without setae, but with 0-1 small, indistinct sensilla (?) on antero-dorsal border. Dorsocentrals uniserial to just slightly staggered posteriorly; DCS/side 9 (6-12), $MaxL_{dcs}$ 193 (170-220) (n = 4); PAS/side 9 (7-11); scutellar setae dispersed; ScS about 25-41 (n = 4), $MaxL_{scs}$ 237-284 (n = 3); ASR 0.67 (0.66-0.69); 3-12 setae on epimeral II protuberance.

WING. — L_w 3.9 (3.6-4.1) mm, W_w 1.17 (1.11-1.24) mm. Costal projection 121 (107-137) or 6.7 (6.0-7.5) times its width. Apparent m-cu distal to apparent fCu by about 2-4 times width of apparent m-cu. VR 0.92 (0.90-0.93). Remigium with 1 or 2 strong setae on hand, 1 or 2 weak setae and about 12-15 campaniform sensilla just beyond wrist, and 3 setae and 4 large and 9-10 small campaniform sensilla on distal 0.5 of forearm. Setae 19 (12-24) on R, 11 (8-14) on R_1, and 3 (2-5) on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 3-4 ventrally on Sc just beyond arculus, 2 dorsally on R_1, 1 dorsally and 1 ventrally near base of R_{2+3}, and 2-4 dorsally on R_{4+5}. Squama with about 40-71 strong setae, $MaxL_{sqs}$ 149-198.

LEGS. — $\bar{L}_{p_I} : \bar{L}_{tot}$ 1.13; Fe I with sparse postero-dorsal beard of about 8-10 long setae. Apical spur of Ti I long, slender, with sparse, short prickles on basal 0.3-0.5; apical spurs otherwise essentially as in *D. mendotae*. Spiniform setae on first 3 tarsomeres of P I-III as follows: 2-6, 2 (apical), 0; 12-15, 5-6, 0; 16-19, 7-10, 0-1 (at about 0.5). Lengths and ratios of leg segments as follows:

	Fe	Ti	Tm_1	Tm_{2-5}	LR	BV	SV
P_I	1569 (1445–1663)	1857 (1646–1994)	1418 (1294–1512)	1381 (1226–1562)	0.77 (0.73–0.79)	3.52 (3.28–3.76)	2.42 (2.34–2.50)
P_{II}	1757 (1613–1893)	1730 (1546–1893)	880 (806–911)	1028 (924–1126)	0.51 (0.48–0.54)	4.25 (4.00–4.43)	3.96 (3.73–4.13)
P_{III}	1989 (1825–2163)	2109 (1927–2298)	1411 (1277–1529)	1361 (1243–1462)	0.67 (0.65–0.70)	4.05 (3.97–4.12)	2.91 (2.78–3.02)

HYPOPYGIUM (without reference to *D. mendotae*). — Fig. 132. Tg IX with 7-11 setae/side. Anal point fairly long, slender, slightly broadening basally, with minute apical peg; strong apodemes on underside of Tg IX diverging from base of anal point and arching to antero-lateral corners of Tg IX; L_{gnex} 313 (304-326): $\bar{L}_{tot}:\bar{L}_{gnex}$ 18. Basal plate weakly to moderately developed, with numerous microtrichia ventrally and with disto-medial margin obtuse to right-angled. Medial field well developed, with well-delimited dorsal border and distal end free; medial field with numerous microtrichia and setae, with loose group of fairly stout setae proximo-ventrally. Gonostylus with distal 0.3 much narrower than proximal 0.7, strongly curved, with single subterminal peg and terminal ridge. Sternapodeme a simple arch. Basal wedge short but well developed, rugose.

DIAGNOSIS. — Antenna plumose, eyes not hairy; gonostylus fairly sharply narrowed at about 0.6 its length, distal portion curved. The gonostylus of *garretti* is unlike any other *Diamesa.*

MATERIAL EXAMINED. — *British Columbia,* Cranbrook, 9.XI, 25.X, 5 males (paratypes and holotype) (CNC); *British Columbia,* Cranbrook, 17.XI, C. B. D. Garrett, 1 paratype male, Cornell paratype no. 2324 (Corn); *British Columbia,* Cranbrook, 9.XI, 2 males (Corn); *British Columbia,* Manning Prov. Park, 8 males, about 20 pupal exuviae (CNC); *Idaho,* Moscow Mt., 6.1.7 (ALMelander collection), 5 males (USNM); *Idaho,* Moscow, J. M. Aldrich, coll., *Diamesa waltlii* Mg, OAJ, 1 male (USNM); *Idaho,* Moscow, Latah Co., XII-17-1960, W. F. Barr, collector, on snow, 1 male (USNM); *Montana,* waterfall in riverlet on E. shore of Flathead Lake, 10 mi NE Polson; 11-VIII-68, leg. J. E. Sublette, 2 male pupae (JES); *Washington,* Bellingham, Whatcom County, 4-16-1964, C. C. Priest, collector, 19 males (UMn, WWSU); *Wyoming,* 44°57′44″N, 109°29′00″W, alt 10,300′, 31 mi. N, 21 mi. W of Cody. Drift in small rocky stream feeding Frozen Lake, 7 PM Aug 13-9AM Aug 14, 1969, leg. Dean Hansen, 1 mature male pupa (UMn); ditto, but on rocks in same stream, 1 mature male pupa (UMn); *Wyoming,* 44°10′N, 107°05′W, Powder River Pass, 18 mi W, 13 mi S of Buffalo, Alt. 9,600′, sweeping in spruce-fir forest 26, 27 Aug. 1967, leg. Dean Hansen, 8 males (UMn).

DISCUSSION. — *D. garretti* was described as *D. borealis* by Garrett (1925) from British Columbia. It remained unrecognizable until Sublette (1967a) redescribed the species from type material purchased from Garrett by the CNC. Sublette (1967a) designated a lectotype from this material, and Sublette (1970) also redescribed some of Garrett's material in the Illinois Natural History Survey. Sublette (1970 and personal communication) had originally thought the Illinois Natural History Survey material represented a second species, but additional specimens from my material convinced him that the apparent differences were largely due to slide mounting variation. If slides are carefully made, the shape of the "subapical lobe" (Sublette, 1970) (= distal end of the medial field) and "basal lobe" (Sublette, 1970) (= proximal end of the medial field) don't vary that much. The shape of the gonostylus, however, can vary quite a bit depending on its orientation (compare my Figs. 132a, b, c; Sublette, 1967a: Fig. 2; and Sublette, 1970: Fig. 1).

Garrett's description does not permit determination of this species. To his credit, however, Garrett had drawn (but not published) an excellent hypopygial figure of "*borealis.*" This figure showed the gonostylus from several aspects and also showed the phallapodeme, sternapodeme, coxapodeme, basal foramen, and aedeagal lobes. It is a shame the figure was not published along with the description, for it could have stimulated other chironomid workers to publish better hypopygial figures. Figures showing the details that Garrett drew weren't commonly published until the 1960's.

Sublette (1967a, 1970) considers that *garretti* is close to *chorea*, however I feel that the medial field and rest of the gonocoxite are closest to *spinacies* and *arctica*.

Location of type. — Lectotype designated by Sublette (1967a) at the CNC. Garrett's holotype was partially slide-mounted and was at the CNC, although it could not be found when Sublette was examining the CNC's material. I examined both the holotype and the lectotype designated by Sublette (1967a).

Diamesa geminata Kieffer

D. geminata Kieffer, 1926: 79-81 (described from male and female from northwestern Greenland): Oliver, 1959: 62 (regards *D. furcata* Edw. as a synonym); Sublette and Sublette, 1965: 151 (as senior synonym to *furcata*).

D. furcata Edwards, 1933: 616, 617-618 (described from 2 males, 7 females from Akpatok Island, Hudson Strait; suggests it may be *Syndiamesa biappendiculata* Goet.); Pagast, 1947: 521-523 (suggests an unknown pupa, *D. spec. I*, could be *furcata*); Oliver, 1959: 62 (as synonym to *geminata*).

D. (*Syndiamesa*) *biappendiculata* Goetghebuer, *in* Remy, 1928a: 52-53. **New synonym.** (Described from 1 male from Jameson Land, East Greenland). Goetghebuer, *in* Remy, 1928b: 90-91 (repeat of above description; figure of hypopygium).

Syndiamesa (*Syndiamesa*) *biappendiculata* Goet. Goetghebuer, 1928: 125-126, Figs. 1, 2 (in key; figure of hypopygium, portion of wing venation); Goetghebuer, 1932 (in key; brief description, figure of hypopygium); Goetghebuer and Lenz, 1939: 5, 6, Fig. 6 (in key; yet another repeat of hypopygium figure, brief description).

Syndiamesa biappendiculata Goet. Thienemann, 1937a: 79 (suggests it may possibly be a Podonominae).

D. biappendiculata Goet. Pagast, 1947: 521-523 (suggests an unknown pupa, *D. spec. I*, could be *biappendiculata*); Sublette and Sublette, 1965: 151 (generic placement).

Description (unless otherwise stated, n = 5 and measurements are in microns): as in *D. mendotae* except:

Total length. — 4.2 (3.7-4.4) mm.

Coloration. — not noted.

Antenna. — longest flagellar seta 0.57-0.59L_{fl} (n = 2); Flm_{13} with apical 0.27-0.30 spindle-shaped, mainly swollen ventrally; 1-2 short, slender setae dorso- and ventro-medially on Flm_1; long (MaxL about 650-670) flagellar setae 0-1 on Flm_1, about 3 on Flm_2, about 7-9 on Flm_3, increasing to about 15 on Flm_{12}, numerous on Flm_{13}; setae on basal 0.1-0.3 of spindle-shaped region of Flm_{13}; $\overline{L_{flm_{1-13}}:W_{flm_{1-13}}}$ 88:49, 22:43, 25:40, 28:37, 27:38, 28:37, 30:37, 33:36, 37:35, 40:34, 41:34, 43:33, 555:32; AR 1.26 (1.18-1.35); 1 preapical antennal seta; L_{pas} 35 (30-38); D_{pd} 153 (137-172); 2-3 pedicellar setae ventro-medially; H_{sc} 152 (137-164).

HEAD. — W_h 538 (499-573); dorsal ocular apodeme absent or nearly so; epistomal suture moderate medially and laterally; IOS/side 2 (1-3); postocular setae running uniserially from near postero-ventral margin of eye dorsally to merge with 3-6 stronger, longer outer vertical setae; PtOS/side about 10-12; inner verticals reaching to 0.46-0.68 of distance from dorso-medial margin of eye to midline of vertex. Clypeus slightly swollen anteriorly, about as long as wide; CS 11 (9-13). Eyes not hairy, microtrichia visible as minute points antero-medially, not visible laterally; dorso-medial margin extending not quite as far mesad as ventro-medial margin; H_e 235 (221-245). $\bar{L}_{ps_{2\text{-}5}} : \bar{W}_{ps_{2\text{-}5}} : \overline{MaxL}_{pss_{2\text{-}5}}$ 95:39:76, 133:41:79, 131:34:60, 190:30:25; D_{so} 16 (12-20); CP 0.97 (0.90-1.02); palpal stoutness 3.86 (3.74-4.09); orifice indistinct.

THORAX. — L_{th} 1.13 (0.97-1.22) mm, D_{th} 0.95 (0.70-1.07) mm. Antepronotum with medial commissure strong, not reaching rear margin of phragma 1, reaching to or slightly surpassing anterior margin of scutal process; antepronotal notch right-angled to slightly obtuse, with medial corners rounded and moderately or only weakly surpassing scutal process; LAS/side about 12 (n = 2). Postpronotum without setae and apparently without sensilla(?) on anterodorsal border. Dorsocentrals uniserial; DCS/side 7-10, $MaxL_{dcs}$ 152 (137-166); PAS/side 7-11; humeral scar a very weak, roughened area anterior to dorsal end of parapsidal suture; scutellar setae dispersed; ScS 23-28 (n = 2), $MaxL_{scs}$ about 160. Medioanepisternum II sometimes somewhat poorly delimited postero-ventrally; ASR 0.64 (0.60-0.70); no setae on epimeral II protuberance.

WING (n = 1). — L_w 3.0 mm, W_w 0.95 mm. Rear margin slightly concave proximally, anal lobe about right-angled. Dry wing not available. Slide mounted wing showing: microtrichia visible as numerous, close points at 150×, as very short hair-like projections arising from minute points or dots at 650×. Costal projection 66, or 3.4 times its width; R_1 not enlarged distally; anterior margin of distal 0.2 of R_1 weak; base of r-m distal to apparent m-cu by about 3 times width of r-m; apparent m-cu distal to apparent fCu by about 4 times width of apparent m-cu; VR 0.86. Remigium not easily visible on slides available, only showing 1 strong seta on hand and 2 on distal 0.5 of forearm. Setae 6 on R, 12 on R_1, and 5 on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 2 (at least — region slightly damaged on slide) ventrally on Sc just beyond arculus, 2 dorsally on R_1, 1 dorsally near base of R_{2+3}, and 1 dorsally on R_{4+5}. Squamal setae impossible to count on slides available.

LEGS. — $\bar{L}_{p_I} : \bar{L}_{tot}$ 1.15; Fe I with sparse postero-dorsal beard of about 6-8 long setae. Apical spur of Ti I long, slender, with sparse prickles on basal 0.2-0.4; L_{tispI} 66 (57-76); apical spurs of Ti II stouter, subequal to equal in length, with fairly numerous prickles on basal 0.3-0.4; L_{tispII} 33-55; apical spurs of Ti III with fairly numerous prickles on basal 0.4; $L_{atispIII}$ 38-48, $L_{ptispIII}$ 60-83. Polygon pattern not visible near apex of Ti I. Ti III with posterior comb of about 15-18 spines arranged in a fairly regular single row. Spiniform setae on first 3 tarsomeres of P I-III as follows: 2 (apical), 2 (apical), 1-2 (apical); 7-13, 2-8, 2 (apical); 9-17, 5-8, 2 (apical). Lengths and ratios of leg segments as follows:

	Fe	Ti	Tm_1	$Tm_{2\text{-}5}$	LR	BV	SV
P_I	1330 (1180–1410)	1470 (1280–1650)	1000 (890–1110)	1050 (960–1100)	0.68 (0.67–0.70)	3.63 (3.49–3.82)	2.80 (2.76–2.87)
P_{II}	1380 (1180–1510)	1300 (1100–1510)	670 (570–770)	790 (710–870)	0.52 (0.51–0.52)	4.21 (4.02–4.34)	3.99 (3.91–4.11)
P_{III}	1580 (1330–1790)	1530 (1310–1720)	960 (790–1110)	1000 (720–1130)	0.63 (0.60–0.64)	4.19 (3.82–4.75)	3.29 (3.18–3.35)

Hypopygium (without reference to *D. mendotae*). — Fig. 124. Tg IX with 18 (13-26) setae/side. Anal point short, strong, quite broad, with several tubercles distally and small terminal peg; strong apodemes on underside of Tg IX diverging and arching slightly to antero-lateral corners of Tg IX; L_{gncx} 357 (325-374); $\overline{L}_{tot}$: $\overline{L}_{gncx}$ 12. Basal plate scarcely developed, about right-angled disto-medially. Medial field fairly well developed, with dorsal border not sharply delimited; medial field with numerous microtrichia, with setae particularly strong antero-ventrally; distal end of medial field just barely free. Gonostylus bifed, with dorsal fork slightly longer than ventral fork; ventral fork with subterminal peg and short terminal ridge, dorsal fork tapering distally. Sternapodeme broadest medially, like a truncated triangle. Basal wedge strong, broad, rugose, bluntly pointed.

Diagnosis. — Anal point short, very broad; gonostylus forked. No other nearctic species has a forked gonostylus. ("*Diamesa*" *appendiculata* Lundstroem has a forked gonostylus, but it is not a true *Diamesa*).

Material examined. — Greenland, Etah, 8.13.08, Peary's North Pole Exp. 1908, 2 males (USNM); [*North West Territories*], ND 9-1, C. Skogn Highland, 25.VIII.60, Devon Island Exp., coll. D. R. Oliver, 10 males (CNC); Flying swarm, over scree, in ravine, D. H. S. Davis, 14 Sept. 1931, O. U. Exp. 1931, S. E. Akpatok I., Ungava Bay, N. Canada, D. H. S. Davis, d.d 1931, *Diamesa furcata* Eds. det. in B. M. May 1933, 1 paratype male (Oxford); as above, but 3 females (Oxford).

Discussion. — Kieffer (1926) described *geminata* from a male and a female collected by the Second Norwegian Arctic Expedition in the "Fram" at "Reindeerpoint." Reindeer Point is a small point extending into Foulke Fjord on the northwest coast of Greenland (78°20′ N. lat.). Oliver (1959) examined the holotype of *geminata* at the Zoological Museum, Oslo, and synonymized *furcata* Edw. with *geminata*. I examined one of Edwards' paratypes of *furcata* and agree with Oliver's synonymy. Goetghebuer (*in* Remy, 1928a) described *D. biapendiculata* from East Greenland, stating that the fourth tarsomere was cylindrical, although shorter than the fifth. I think Goetghebuer simply erred in this observation, for the fourth tarsomere in *geminata* is cordiform, and the hypopygial figure drawn by Goetghebuer is clearly that of *geminata*.

LOCATION OF TYPE. — The holotype of *geminata* is at the Zoological Museum, Oslo (Kieffer, 1926; Oliver, 1959); I did not examine the holotype.

Diamesa gregsoni Edwards

D. gregsoni Edwards, 1933: 618 (described from 1 male, 1 female from Akpatok Island, Hudson Strait); Serra-Tosio, 1967c: 93-96 (records from Norway; description and figure of hypopygium of male); Serra-Tosio, 1969a: 205, 206 (records same male as above, from Brundin collection); Serra-Tosio, 1971: 145-147, Figs. 55.1 & 2, 152 (description, figure of hypopygium of male).

Description (unless otherwise stated, n = 3 and measurements are in microns): as in *D. mendotae* except:

TOTAL LENGTH. — 4.6 mm (n = 1) (uncleared specimen in alcohol).

COLORATION. — not noted.

ANTENNA. — longest flagellar seta 0.65-0.68L_{fl}; Flm_{13} with apical 0.22-0.24 spindle-shaped, mainly swollen ventrally; 2-3 short slender setae dorso- and ventro-medially on Flm_1; long (MaxL 793-883) flagellar setae 1 on Flm_1, 2 on Flm_2, 8 on Flm_3, about 10-11 on Flm_4, increasing to 13-14 on Flm_{12}, numerous on Flm_{13}; setae only on basal 0.1-0.2 of spindle-shaped region of Flm_{13}; spindle-shaped region of Flm_{13} with numerous slender, pointed sensilla basiconica, apparently 0 or only 2 similar but blunter, shorter sensilla basiconica arising from more distinct pits than the preceding, and 5-6 ringed sensilla coeloconica; $L_{flm_{1-13}}:W_{flm_{1-13}}$ 96:56, 21:49, 24:47, 29:43, 28:42, 29:41, 32:41, 33:40, 38:40, 37:40, 41:39, 41:39, 728:37; AR 1.38-1.40; 1 preapical antennal seta; L_{pas} 47 (46-48); D_{pd} 176 (172-182); 2-3 pedicellar setae ventro-medially; H_{sc} 188-192.

HEAD. — W_h 701 (663-736); epistomal suture moderate to weak medially, weak to absent laterally; IOS/side 5 (3-6); PtOS/side 13-17; inner verticals reaching to 0.57 (0.54-0.63) of distance from dorso-medial margin of eye to midline of vertex. Clypeus slightly swollen anteriorly, about as wide as long; CS 18 (15-22). Eyes not hairy, microtrichia visible antero-medially as minute points, not visible laterally; dorso-medial margin extending not quite as far mesad as ventro-medial margin; H_e 313 (294-327). $\overline{L}_{ps_{2-5}}:\overline{W}_{ps_{2-5}}:\overline{MaxL}_{pss_{2-5}}$ 106:41:92, 168:49:80, 172:39:79, 235:35:32; D_{so} 14-16; CP 1.02 (1.00-1.06); palpal stoutness 4.16 (3.85-4.54).

THORAX. — L_{th} 1.53 mm, D_{th} 1.46 mm (n = 1). Antepronotum with medial commissure strong, not quite reaching rear margin of phragma I, reaching to or slightly surpassing anterior margin of scutal process; antepronotal notch about right-angled, with medial corners rounded and well surpassing scutal process; LAS/side about 12 (n = 1). Postpronotum without setae and apparently without small sensilla(?) on antero-dorsal border; dorsocentrals uniserial; DCS/side 11 (10-12) (n = 3), $MaxL_{dcs}$ 164 (n = 1); PAS/side 13 (10-15) (one specimen with 2 clear campaniform sensilla just before and above prealar setae); scutellar setae dispersed or very roughly in 3 rows; ScS 36-42 (n = 3), $MaxL_{scs}$ about 230 (n = 1); ASR 0.64 (0.63-0.67); 5-7 setae on epimeral II protuberance.

WING. — L_w 3.3-3.5 mm, W_w 1.07-1.17 mm. Dry wing not available. Slide mounted wing showing: Costal projection 73-119, or 4.6-6.0 times its width; Sc as in *D. mendotae* except not quite reaching C. VR 0.91-0.93. Remigium with 1 strong seta on hand, 1-3 weak setae and about 5-8 campaniform sensilla just beyond wrist, and 4 setae and 4-5 large and about 6-9 smaller campaniform sensilla on distal 0.5 of forearm. Setae 17-19 on R, 10-14 on R_1, and 4-11 on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 3 ventrally on Sc just beyond arculus, 2 dorsally on R_1, 1 dorsally and 0 or 1 or 1 small seta ventrally near base of R_{2+3}, and 3-4 dorsally on R_{4+5}. Squama with about 45-76 strong setae, $MaxL_{sqs}$ 149-186.

LEGS. — $\bar{L}_{p_I}:\bar{L}_{tot}$ not measurable on slides available; Fe I with sparse postero-dorsal beard of about 7 long setae. Apical spur of Ti I long, slender, with sparse prickles on basal 0.3-0.4; apical spurs of Ti II stouter, subequal in length, with fairly numerous prickles on basal 0.5; apical spurs otherwise essentially as in *D. mendotae.* Polygon pattern on Ti III well developed. Spiniform setae on first 3 tarsomeres of P I-III as follows: 2 (apical), 2 (apical), 0; 11-13, 2 (apical)-4, 0; 15-20, 8-9, 0. Lengths and ratios of leg segments as follows:

	Fe	Ti	Tm_1	$Tm_{2\text{-}5}$	LR	BV	SV
P_I	1410–1530	1680–1800	1260–1350	1260–1310	0.75–0.76	3.45–3.66	2.45–2.46
P_{II}	1630–1710	1580–1700	820–860	960–990	0.51–0.52	4.14–4.35	3.90–3.98
P_{III}	1760–1930	1840–2030	1300–1400	1280–1380	0.68–0.70	3.83–3.96	2.78–2.87

HYPOPYGIUM (without reference to *D. mendotae*). — Fig. 139. Tg IX with 12-14 setae/side. Anal point fairly long, slender distally but broadening basally, with minute apical peg; strong, slightly arched apodemes on underside of Tg IX diverging from base of anal point, running to antero-lateral corners of Tg IX. L_{gnex} 356-379; $\bar{L}_{tot}:\bar{L}_{gnex}$ 13. Basal plate moderately developed, with numerous microtrichia ventrally. Medial field well developed, with dorsal border somewhat rugose, not sharply delimited; medial field with numerous microtrichia and setae, setae particularly strong antero-ventrally; distal end of medial field free, disto-dorsal corner produced dorsad to form a flap. Gonostylus of fairly equal width throughout, gently arched, with subterminal peg and short terminal ridge. Sternadopeme fairly broad medially, with fore margin nearly straight or slightly concave medially. Basal wedge short but well-developed, rugose.

DIAGNOSIS. — Antenna plumose, eyes not hairy; medial field with disto-dorsal margin produced flap-like.

MATERIAL EXAMINED. — [*New Brunswick*], Camp Adams, Northumb. Co., N. B., 8-IV-1962, J. Marshall, 4 males, several females (CNC); [*North West Territories*], Akpatok Island, flying over and near stream, valley head, 3.IX.31, Gregson, holotype male (BM(NH)).

DISCUSSION. — *D. gregsoni* was described from Akpatok Island, Hudson Strait; the only additional specimens I have seen were from New Brunswick. Serra-Tosio (1967c) recorded it from the Palaearctic.

LOCATION OF TYPES. — Holotype male at the BM(NH), allotype female at Oxford University. Mr. A. M. Hutson kindly loaned me the holotype for examination, and Dr. G. C. Varley and Mr. E. Taylor kindly loaned me the allotype female.

Diamesa haydaki new species

Description (unless otherwise stated, n = 5 and measurements are in microns): as in *D. mendotae* except:

TOTAL LENGTH. — 4.7 (4.3-5.1) mm.

COLORATION (pinned specimen). — about as in *D. mendotae* (n = 1).

ANTENNA. — longest flagellar seta 0.63 (0.56-0.69)L_{fl}; Flm_{13} with apical 0.19-0.24 spindle-shaped, mainly swollen ventrally; 2-3 short, slender setae dorso- and ventro-medially on Flm_1; long (MaxL 1145-1358) flagellar setae 1 on Flm_1, 3-4 on Flm_2, 7-10 on Flm_3, 9-12 on Flm_4, increasing to 14-15 on Flm_{12}, numerous on Flm_{13}; setae on basal 0.1-0.3 of spindle-shaped region of Flm_{13}; $\overline{L}_{flm_{1-13}} : \overline{W}_{flm_{1-13}}$ 90:56, 24:48, 25:48, 27:44, 26:43, 27:43, 29:44, 30:45, 33:44, 34:43, 36:41, 37:40, 772:39; AR 1.66 (1.41-1.76); 1 preapical antennal seta; L_{pas} 37 (27-49); D_{pd} 180 (168-188); pedicellar setae absent; H_{sc} 200 (180-218).

HEAD. — W_h 676 (645-717); dorsal ocular apodeme short to very long, in the latter case extending parallel to top of antennal socket about 0.75 of distance to coronal suture; epistomal suture varying from strong medially, weak laterally, to moderate medially, absent laterally; IOS/side 3 (2-4); rarely with a pair of medial vertex setae; PtOS/side about 7-11; inner vertical setae few (5-7), confined almost to dorsal-most region of vertex; inner verticals reaching to 0.46 (0.41-0.50) of distance from dorso-medial margin of eye to midline of vertex. Clypeus slightly swollen anteriorly, about as wide as long; CS 12 (10-16). Eyes hairy, microtrichia 1.5-2 times height of ommatidial lenses; dorso-medial margin of eye ranging from truncate, with dorsal corner rounded, to more rounded, with dorsal corner and dorso-medial margin merging in single broad curve; dorso-medial margin not extending as far mesad as ventro-medial margin; H_e 300 (284-312); antennifer weak. $\overline{L}_{ps_{2-5}} : \overline{W}_{ps_{2-5}}$ 90:30, 150:44, 151:35, 224:30 (most setae on palpi were broken off, so they were not measured); D_{so} 16 (14-20); CP 1.11 (1.08-1.17); palpal stoutness 4.16 (3.94-4.50).

THORAX. — L_{th} 1.35 (1.29-1.42) mm, D_{th} 1.28 (1.22-1.38) mm. Antepronotum with medial commissure strong, not quite reaching rear margin of phragma I, not surpassing scutal process; LAS/side 10 (8-13); postpronotum without setae, but with 1-2 faint sensilla(?) on antero-dorsal border. Dorsocentrals uniserial to slightly staggered posteriorly; DCS/side 6 (3-9), $MaxL_{dcs}$ 132 (99-152); PAS/side 7 (4-10); scutellar setae dispersed or roughly in 2 rows; ScS about 14-24 (difficult to count in slides available), $MaxL_{scs}$ 140-170 (n = 3); ASR 0.69 (0.68-0.70); 0-5 setae on epimeral II protuberance.

WING. — L_w 3.1 (2.8-3.4) mm, W_w 0.97 (0.82-1.05) mm. Costal projection 127 (109-139) or 6.6-7.9 times its width; apparent m-cu distal to apparent fCu by about 2-3 times width of apparent m-cu; VR 0.94 (0.93-0.95). Remigium with 1 strong seta on hand, 0-1 weak seta and about 6-12 campaniform sensilla just beyond wrist, and 2-3 setae and 4 large and about 9 smaller campaniform sensilla on distal 0.5 of forearm. Setae 4-6 on proximal 0.4-0.6 of R, 5-9 on R_1, and 2-5 on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 2-3 ventrally on Sc just beyond arculus, 1-2 dorsally on R_1, 1 dorsally and 1 (rarely 0) ventrally near base of R_{2+3}, and 2-5 dorsally on R_{4+5}. Squama with 42-46 strong setae, $MaxL_{sqs}$ 115-150; 1 specimen with 1 short seta on alula.

LEGS. — $\bar{L}_{p_I}:\bar{L}_{tot}$ 1.10; Fe I without visible beard in slides available. Apical spur of Ti I long, slender, with only a few prickles on basal 0.3; L_{tispI} 72 (67-76); apical spurs of Ti II stouter, subequal to equal in length, with fairly numerous prickles on basal 0.4-0.5; apical spurs of Ti III with fairly numerous prickles on basal 0.4-0.5; $L_{atispIII}$ 56 (52-60), $L_{ptispIII}$ 78 (69-90). Ti III with posterior comb of about 14-17 spines arranged in a fairly regular single row. Spiniform setae on first 3 tarsomeres of P I-III as follows: 2 (apical)-8, 0-2 (apical), 0; 10-13, 3-5, 0; 12-15, 5-9, 0-2 (at about 0.6). Lengths and ratios of leg segments as follows:

	Fe	Ti	Tm_1	Tm_{2-5}	LR	BV	SV
P_I	1320 (1180–1500)	1580 (1410–1760)	1120 (990–1260)	1150 (1030–1270)	0.71 (0.70–0.72)	3.50 (3.40–3.58)	2.58 (2.53–2.61)
P_{II}	1420 (1240–1580)	1410 (1260–1560)	710 (620–840)	860 (770–990)	0.50 (0.47–0.54)	4.11 (4.00–4.25)	4.00 (3.74–4.14)
P_{III}	1600 (1430–1760)	1720 (1510–1890)	1060 (940–1240)	1130 (1010–1280)	0.62 (0.60–0.66)	3.89 (3.74–4.06)	3.13 (2.94–3.26)

HYPOPYGIUM (without reference to *D. mendotae*). — Fig. 119. Tg IX with 12 (9-15) setae/side. Anal point strong, fairly slender, broadening just slightly basally, with short apical peg; moderate apodemes on underside of Tg IX diverging slightly, then arching to antero-lateral corners of Tg IX; L_{gncx} 293 (276-304), $\bar{L}_{tot}:\bar{L}_{gncx}$ 16. Basal plate scarcely developed. Medial field well developed, dorsal border well delimited; medial field with numerous microtrichia and setae; distal end of medial field broad, free. Basimedial setal cluster with fairly numerous long, strong setae directed antero-mesad. Gonostylus broadest at 0.5, with subterminal peg and very short terminal ridge. Sternapodeme fairly slender medially, with weak antero-lateral projections; fore margin fairly straight medially. Basal wedge very broad, triangular, weakly rugose.

DIAGNOSIS. — Antenna plumose, eyes hairy, basal plate scarcely developed, basimedial setal cluster strong.

MATERIAL EXAMINED. — *Arizona,* Southwest Research Station, Cochise Co., 5400′, 5 mi W. Portal, 15-20-III 1966, 3 males (JES); *Colorado,* Ft. Collins, VI.12. 41, light trap, M. A. Palmer, 1 male (ColStU); *Minnesota,* Rock Co., Steen, N. J. Mosquito trap, 1 May 1968, leg. E. F. Cook, 2 males (UMn); *Wyoming,* Laramie, 2, 3, 17 June 1947, light trap, 4 males (UWyo); Laramie, 25, 26 June 1947, D. G. Denning, collector, light trap, 2 males (UWyo); Powder River Pass, 40°10′N, 107° 05′W, 18 mi W, 13 mi. S of Buffalo, alt. 9600′, sweeping in spruce-fir forest, 26, 27 Aug 1967, leg. D. Hansen, 2 males (UMn).

DISCUSSION. — *D. haydaki* is interesting for its distribution. The Minnesota record is in the former prairie region, i.e., flat terrain and few trees. The location near Powder River Pass in Wyoming, however, is at 9,600′ and is near timber line. Only *heteropus* has a similar distribution. *D. haydaki* is also interesting in consistently lacking setae on the pedicel.

The species is named in honor of the late Dr. Mykola H. Haydak, who was so kind and helpful to me in getting me interested and started in bee-keeping.

LOCATION OF TYPES. — Holotype is the specimen collected by me 27 Aug. 1967 at Powder River Pass, Wyoming (slide DH69-261). The other specimens examined are designated paratypes and are returned to their respective museums, while the holotype is deposited in the Entomology Collection of the Department of Entomology, University of Minnesota, St. Paul.

Diamesa heteropus (Coquillett)

Eutanypus borealis Coquillett. Cockerell, 1900: 439 (misdetermination).
Tanypus heteropus Coquillett, 1905: 66 (described from 9 males, 1 female, from Washington, New Mexico, New Hampshire; series was probably mixed).
Protanypus heteropus Coquillett. Johannsen, 1908: 271 (generic placement).
Adiamesa confusa Garrett, 1925: 5-6. **New synonym.** (Described from 1 male from British Columbia).
Podonomus confusus (Garrett). Sublette and Sublette, 1965: 150 (generic placement).
Diamesa banana Garrett, 1925: 6 (described from 2 males from British Columbia); Roback, 1957a: 6 (reproduces manuscript drawing by Garrett of hypopygium of *D. banana*); Sublette, 1967a: 294-296 (review of type; as new synonym to *D. heteropus* (Coq.)). Saether, 1969: 21-23 (figure of hypopygium; regards as valid species).
D. onteona Roback, 1957a: 6-7, 20 (described from 1 male from Utah; figures Tm_{4+5}, hypopygium. **New synonym.**
D. heteropus (Coquillett). Johannsen, 1952: 13 (as a junior synonym to *D. nivoriunda* (Fitch)); Sublette, 1966: 545-586 (redescription of holotype; figure of hypopygium).

Description (unless otherwise stated, n = 5 and measurements are in microns): as in *D. mendotae* except:

TOTAL LENGTH. — 5.1 (4.1-5.9) mm (n = 6).

COLORATION (pinned specimen). — about as in *D. mendotae* (Mutt.).

ANTENNA. — longest flagellar seta 0.61 (0.58-0.66)L_{fl}; Flm_{13} with apical 0.24-0.27 spindle-shaped, mainly swollen ventrally; 2-3 short, slender setae dorso- and ventro-medially on Flm_1; long (MaxL 720-818) flagellar setae 1 on Flm_1, 3-4 on Flm_2, 6-9 on Flm_3, 10-11 on Flm_4, increasing to 13-15 on Flm_{12}, numerous on Flm_{13} (n = 3); setae on basal 0.3 of spindle-shaped region of Flm_{13}; spindle-shaped region of Flm_{13} with numerous slender, pointed sensilla basiconica arising from little or no pit, several similar sensilla arising from distinct pits, and 5-6 ringed sensilla coeloconica (n = 3); $\overline{L}_{flm_{1-13}} : \overline{W}_{flm_{1-13}}$ 92:55, 25:49, 28:48, 30:45, 30:42, 32:42, 34:42, 37:42, 42:41, 42:41, 44:39, 46:38, 709:38; AR 1.31 (1.26-1.41); L_{pas} 40 (36-42); D_{pd} 175 (164-184); 2-3 pedicellar setae ventro-medially; H_{sc} 197 (174-220).

HEAD. — W_h 712 (630-769); dorsal ocular apodeme fairly strong; epistomal suture ranging from moderate all the way across to strong medially, weak laterally; IOS/side 3 (2-4); inner verticals reaching to 0.49 (0.44-0.56) of distance from dorso-medial margin of eye to midline of vertex. Clypeus slightly swollen anteriorly, as wide as long or slightly wider than long; CS 15 (8-23); dorso-medial margin of eye not extending as far mesad as ventro-medial margin; H_e 298 (270-319); $\overline{L}_{ps_{2-5}} : \overline{W}_{ps_{2-5}} : \overline{MaxL}_{pss_{2-5}}$ 103:40:85, 151:48:69, 152:39:57, 225:32:33; CP 1.12 (1.06-1.18); palpal stoutness 3.99 (3.77-4.55).

THORAX. — L_{th} 1.47 (1.14-1.70) mm, D_{th} 1.39 (1.09-1.58) mm (n = 6). Antepronotum with medial commissure not reaching rear margin of phragma I, reaching to or slightly surpassing scutal process; antepronotal notch varying from acute, with rounded corners, to very short and about right-angled; LAS/side 13 (8-17). Postpronotal apophyseal pit small, faint, rarely double; postpronotal apophyses weak. Dorsocentrals uniserial or slightly staggered posteriorly; DCS/side 10 (7-12), $MaxL_{dcs}$ 160 (135-198); PAS/side 9 (5-13); humeral scar a roughened or tuberous irregular area at dorsal end of parapsidal suture; scutellar setae roughly in three rows; ScS 29 (20-44), $MaxL_{scs}$ 205 (158-238); ASR 0.68 (0.66-0.69); 1-5 fine setae on epimeral II protuberance.

WING. — L_w 3.5 (3.1-3.9) mm, W_w 1.18 (1.05-1.28) mm. Costal projection 103 (89-119) or 3.8-6.0 times its width; apparent m-cu distal to apparent fCu by about 2-4 times width of apparent m-cu; VR 0.94 (0.91-0.98). Remigium with 1 strong seta on hand, 0-1 weak seta and about 12-16 campaniform sensilla just beyond wrist, and 2-4 setae and 4 large and about 6-10 smaller campaniform sensilla on distal 0.5 of forearm. Setae 13 (11-16) on R, 9 (8-11) on R_1, 9 (6-13) on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 2-3 ventrally on Sc just beyond arculus, 2-3 dorsally on R_1, 1 (rarely 0) dorsally and 1 ventrally near base of R_{2+3}, and 3-5 dorsally on R_{4+5}. Squama with 32-60 strong setae, $MaxL_{sqs}$ 129-194.

	Fe	Ti	Tm_1	Tm_{2-5}	LR	BV	SV
P_I	1500 (1310–1650)	1830 (1560–2030)	1300 (1080–1450)	1340 (1180–1460)	0.71 (0.69–0.73)	3.46 (3.32–3.56)	2.56 (2.51–2.67)
P_{II}	1640 (1400–1830)	1620 (1390–1790)	790 (660–890)	970 (860–1080)	0.49 (0.47–0.50)	4.14 (4.02–4.25)	4.15 (4.06–4.31)
P_{III}	1830 (1600–2030)	1970 (1680–2160)	1300 (1060–1510)	1300 (1150–1510)	0.67 (0.60–0.70)	3.90 (3.71–4.03)	2.93 (2.71–3.14)

LEGS. — $\bar{L}_{p_I}:\bar{L}_{tot}$ 1.17; Fe I with very sparse postero-dorsal beard of about 1-4 long setae. $L_{tisp I}$ 64-76; apical spurs otherwise essentially as in *D. mendotae.* Spiniform setae on first 3 tarsomeres of P I-III as follows: 2 (apical)-3, 2 (apical), 0; 9-15, 3-5, 0; 13-23, 5-10, 0-1 (at about 0.5-0.7). Lengths and ratios of leg segments, p. 96.

HYPOPYGIUM (without reference to *D. mendotae*). — Fig. 113. Tg IX with 7 (3-10) setae/side. Anal point short, slender, pointed, gradually broadening basally, apparently with small, pointed terminal peg; weak to moderate apodemes on underside of Tg IX diverging only slightly and running to and then along fore margin of Tg IX; L_{gnex} 298 (271-318); $L_{tot}:L_{gnex}$ 17. Basal plate scarcely developed but with coarse microtrichia ventrally. Medial field well developed, well sclerotized, with dorsal border poorly delimited; mesal surface of medial field flat and vertical, with numerous microtrichia and setae, setae particularly strong disto-ventrally; distal 0.3 of medial field free. Basimedial setal cluster located beneath medial field, with numerous very long, strong setae directed antero-mesad. Gonostylus broadest at basal 0.2, tapering distally; gonostylus with subterminal peg and only short, very weak terminal ridge. Sternapodeme fairly slender medially, broader antero-laterally, with fore margin fairly straight. Basal wedge short but strong, rugose.

DIAGNOSIS. — Antenna plumose, eyes hairy; anal point fairly short; basimedial setal cluster located below medial field; medial field flat, vertical medially.

MATERIAL EXAMINED. — *Alaska,* Anchorage-Eklunta Flats, 2 Sept. 1966, K. M. Sommerman, jeep trap 66-46, 1 male (USNM); Tamnak Valley, Attu. [island at western end of Aleutians], III-12-45, flying on snow, 0°C, A. Bajkov, 1 male (USNM); UmnakId [Umnak Island, one of the Fox Islands in the Aleutians], 24-VI-1945, RW Drabble, 1 male (USNM); [*Washington*], Columbia R., 10-IV-1962, about 6 males, several pupal exuviae (CNC); Columbia R., Hampton Brantford Co., 7.II. 1962, 6.III.1952, 12 pupal exuviae (CNC); Columbia R. 24.VI.1952, 2 pupae (CNC); Columbia R., Hanford, Benton County, 2-I-52, 2 males not completely emerged from pupae (CNC); Columbia R., Hantford Benton Co., 2 Jan. 1952, several males and pupal exuviae (CNC); [*British Columbia*], Cranbrook, June, male holotype of *Adiamesa confusa* Garrett (CNC); Cranbrook, 12.VIII, C. B. D. Garrett, lectotype of *D. banana* Garrett (CNC); Roadside stream near Bonnington Falls, Nelson, B. C., 25.V.1964, G. C. and D. M. Wood, 1 male (CNC); *California,* Convict Creek, Mono County, 7,200′, 17-VII-1963, leg. H. D. Kennedy, light trap, 1 male (JES); Inyo Co., Bennetts Well, III.30.1954, A. E. Michelbacher, collector, 1 male (CalifInsSur); Mono County, Sonora Pass, Leavitt Creek, elv. 8,000′, 18 July 1968, leg. Ronald Hellenthal, light trap, 1 male (UMn); *Colorado,* Ft. Collins, 3-24-03, 1 male (ColStU); 38°31′N, 106°08′W, 3.5 mi. W of Poncha Springs, sweeping under bridge over Little Arkansas River, 11 Dec. 1968, leg. D. Hansen, 2 males (UMn); *Idaho,* Craters of the Moon Nat. Mon., 5 July 1965, attracted to black light, D. S. Horning, Jr., collector, 362, 1 male (USNM); Latah Co., Trails Pond, found on ice and snow, 7 March 1969, J. M. Gillespie, 5 males (UMn, UtStU); Lemhi Co., Texas Creek, Hwy. 28, 2 miles south of Leadore, 7 March 1965, leg. A. V. Nebeker, 1 male (ANSP); Moscow, 17 Dec. 1961, W. F. Barr, on snow, *Diamesa onteona*

Roback [det. ?], 1 male (USNM); Moscow Mt., 6.1.7, ALMelander collection, 1961, 2 males (USNM); Power Co., 2 mi. W Massacre Rocks II-4-1966, on snow, W. F. Barr, collector, 16 males (UtStU); Twin Falls, Pole 27, trap 2, 16 April 1932, wind vane trap, 1 male (USNM); *Minnesota*, Polk County, Crookston Experiment Station, N. J. mosquito trap, 14 May 1968, leg. E. F. Cook, 1 male (UMn); Stevens County, Morris Experiment Station, N. J. mosquito trap, 21 May 1968, leg. E. F. Cook, 1 male (UMn); *Montana*, Hamilton, II-1960, C. B. Philip, dead on window sills, 5 males (JES); Ravalli Co., 12 Feb. 1941, on fresh snow, coll. W. L. Jellison, 2 males (UMn); *Nebraska*, Cedar Co., Hartington, 18 June 1969, W. W. Wirth, light trap, 1 male (USNM); *Nevada*, Reno, 23 Dec. 1915, 29 Feb. 1916, HGDyar, Coll, 2 males (USNM); [*New Mexico*], Jemez Springs, Sandoval County, N.M., I-20-IV-65, coll. G. Washburn, 1 male (JES); Las Vegas, NM, Cockerell, collector, 1 male (USNM); *Oregon*, Berry Creek, 9 mi. N. Corvallis, Benton County, R. K. Eppley, TP2:22, IV 10-23/65, *Diamesa heteropus* (Coquillett) det. R. K. Eppley 1967, 1 male (JES); Salem, Willamette R., 22 May 1963, KGoeden-light, 1 male (USNM); *Utah*, Logan, 11.8.1938, leg. D. E. Hardy, 2 males (UtStU); Logan, 11 F 09, 1 male (UtStU); Salt Lake County, Big Cottonwood Creek at the water treatment plant, leg. A. V. Nebeker, 14 March, 13 June 1965, 2 males (ANSP); Salt Lake County, Big Cottonwood Creek at the power plant below Storm Mountain, leg. A. V. Nebeker, 19 Jan. 1965, 1 male (ANSP); Wasatch Co., Heber-Midway Bridge, coll. Gerald D. Brooks, XII/17/54, *Diamesa onteona* Roback, holotype male (ANSP); *Washington*, Pullman. 15 Jan. [no year], 26 March 97, collector R. W. Doane, in ALMelander Collection. 1961, 3 males (1 determined as *Diamesa Waltlii* Meig. by Johannsen) (USNM); Pullman, 9 April 97, collector R. W. Doane, 3 males (1 determined as *Diamesa Waltlii* by ?) (USNM); Pullman [no date], in ALMelander Collection, 1961, 1 male (USNM); Pullman, WAS, 15 Apr 1919, A L Melander, in ALMelander Collection. 1961, 1 male (USNM); Pullman, 10 April 17, 12 Apr., 16.IV.30, 3 males (WashStU); Wawawai, 4/24[?] 97, collector R. W. Doane, 1 male (Cornell); Wawawai to Pullman, 2 April '50, R. Spurrier, 2 males (WashStU); WeyCo [Weyerhaeuser Lumber Company] Streams, VI-21-68, IX-7-65, 3 males (UMn): Weyhauser [*sic*] Company Experimental Station, 7-IX-65, slide No. S66-235, 236, *Diamesa heteropus* (Coq.), det J. E. Sublette '66, 2 males (JES); *Wyoming*, Albany Co., Laramie, D. W. Ribble, 25-VIII-1967, 1 male (IllNatHstSur); 44°57′42″N, 109°29′00″W, alt. 10,300′, 31 mi. N, 21 mi. W of Cody, drift in small rocky stream feeding Frozen Lake, 7 PM 13 Aug. — 9 AM 14 Aug. 1969, leg. Dean Hansen, 2 mature male pupae (UMn); Laramie, 17 Jun 1947 [41?], light trap, 1 male (UWyo); 44°17′N, 106°57′W, South Fork Campground, 12 mi. W, 5 mi. S of Buffalo, alt. 7,500′, light trap over Clear Creek, 26 Aug. 1968, leg. Dean Hansen, 1 male (UMn); 44°10′N, 107°05′W, Powder River Pass, 18 mi. W, 13 mi. S of Buffalo, alt. 9,600′, larva collected in bottom debris of tiny (2-12″ wide, to 4″ deep) stream, reared (pupa dead 1 Sept. 1967), 27 Aug. 1967, 1 male, 1 female pupae reared from larvae, apparently *heteropus* (UMn); 44°10′N, 107°05′W, Powder River Pass, 18 mi. W, 13 mi. S of Buffalo, sweeping in spruce-fir forest, 26, 27, 1967, 50 males (UMn).

DISCUSSION. — *D. heteropus* has been described or misdetermined several times. Cockerell (1900) possibly misdetermined *heteropus* as *Eutanypus borealis* (= *D. coquilletti*). A male *heteropus* (without a determination label) labelled "Las Vegas, NM, Cockerell, Collector" was in the material I received from the USNM. This male could be the specimen recorded by Cockerell (1900) or one of the type series of *heteropus*. Coquillett (1905) described *heteropus* from nine males and one female from Pullman, Washington; Las Vegas Hot Springs, New Mexico; and Mt. Washington, New Hampshire. There were six male *heteropus* without determination labels and a male *Diplomesa parva* (Edw.) in the material I received from the USNM. This latter specimen was labelled "Mt. Wash., Mrs. Slosson, Collector, *Diamesa waltlii* Meigen" (det. ?) and could have been the New Hampshire specimen Coquillett included in his type series. Even if not, however, I seriously doubt that Coquillett actually had *heteropus* from as far east as New Hampshire. The other specimens, although not labelled as *heteropus*, were apparently the specimens seen by Coquillett; the dates and collectors match that given by Coquillett (1905).

Garrett's (1925) *D. banana* and Roback's (1957a) *D. onteona* are synonyms of *heteropus*. I have seen the holotypes of both these species and can find no significant differences between these and *heteropus*. "*Adiamesa confusa*" Garrett (1925) is a little more of a problem. The long flagellar setae, as indicated by Garrett (1925), are reduced in number and length, but the flagellomeres, although reduced in number, are not actually shaped like those in *nivicavernicola* or *coquilletti*. The antenna is apparently simply malformed. The hypopygium of the holotype is clearly that of *heteropus*, however, so I feel the specimen is simply a *heteropus* with an aberrant, malformed antenna. Sublette (1967a) could not locate the hypopygial slide of *confusa* when he reviewed the CNC's types and therefore regarded *confusa* as a *nomen dubium*. The slide was subsequently located, however, so *confusa* is determinable and is not a *nomen dubium*, although it is a synonym.

D. heteropus is the species most commonly encountered in the West. Its range extends from Alaska to New Mexico and east to Nebraska and Minnesota. I have seen specimens collected in all months but October and November, although I presume it also emerges then.

Diamesa incallida (Walker)

Chironomus incallidus [7] Walker, 1856: 183 (described from male from England).
Ch. nexilis Walker, 1856: 184-185 (*fide* Edwards, 1929).
D. incallida (Walker). Edwards, 1929: 305-306 (description from Walker's types; synonymizes *nexilis* Walker; figures hypopygium); Goetghebuer and Lindroth, 1931: 280 (records 5 males, 1 female from Iceland); Edwards, 1932: 45 (records 2 mating pairs from Rothiemurchus Forest, G. B.); Pagast, 1947: 471

[7] From *in* (L.), not, and *callidus* (L.), expert, shrewd, crafty, cunning (Brown, 1954).

(description of adult; figure of hypopygium; records from "Estland [Estonia], Noemme" and Swedish Lappland); Wuelker, 1958: 807 (records from Germany); Wuelker, 1959: 342, 345, 346, 347 (records in Europe; comparison of pupa with that of *D. aberrata*, description of larva); Serra-Tosio, 1966: 124 (records from France); Serra-Tosio, 1969a: 205, 206 (records 2 males from Sweden, from Brundin collection); Serra-Tosio, 1971: 137-143, Figs. 48-53 (description of adult male and female, male and female pupa; distribution; ecology of larva).

D. fonticola Saether, 1969: 24-27. **New synonym.** (Described from Manitoba).

D. sp. VII. Thienemann, 1941: Tabelle 13; 41, 46, 189 (3 pupal exuviae from Swedish Lappland); Pagast, 1947: 515, 521; Abb. 75; 551, 571 (brief diagnosis of above pupal exuviae).

Psilodiamesa incallida (Walker). Roback, 1957a: 3, 5-6, 18, 20 (records from Utah).

Description (unless otherwise stated, n = 5 and measurements are in microns): as in *D. mendotae* except:

TOTAL LENGTH. — 5.2 (4.8-5.6) mm.

COLORATION. — not noted.

ANTENNA. — longest flagellar seta 0.75 (0.70-0.82)L_{fl}; Flm_{13} with apical 0.19-0.24 spindle shaped, mainly swollen ventrally; 3-5 short, slender setae dorso- and ventro-medially on Flm_1; long (MaxL 850-1055) flagellar setae 0-1 on Flm_1, 3 on Flm_2, 8-9 on Flm_3, about 9-11 on Flm_4, increasing to 14-15 on Flm_{12}, numerous on Flm_{13}; setae on basal 0.1-0.3 of spindle-shaped region of Flm_{13}; $\overline{L}_{flm\,1\text{-}13} : \overline{W}_{flm\,1\text{-}13}$ 93:60, 21:52, 23:51, 25:48, 27:46, 29:46, 31:46, 34:45, 38:44, 40:44, 44:42, 46:42, 724:40; AR 1.44 (1.24-1.72); 1 preapical antennal seta; L_{pas} 47 (36-55); D_{pd} 184 (173-198); 1-3 pedicellar setae ventro-medially; H_{sc} 198 (186-212).

HEAD. — W_h 737 (703-799); epistomal suture strong to moderate medially, weak to absent laterally; IOS/side 3 (2-5) (not separable from inner verticals in 1 specimen); PtOS 11-18/side; inner verticals reaching to 0.58 (0.45-0.63) of distance from dorso-medial margin of eye to midline of vertex. Clypeus slightly swollen anteriorly, about as wide as long; CS 10 (5-14). Eyes not hairy, microtrichia visible antero-medially as minute points, not visible laterally; dorso-medial margin truncate but very slightly rounded, dorsal corner broadly rounded; H_e 311 (307-317). $\overline{L}_{ps\,2\text{-}5} : \overline{W}_{ps\,2\text{-}5} : \overline{MaxL}_{pss\,2\text{-}5}$ 102:48:113, 172:53:124, 166:41:122, 230:35:43; CP 1.11 (1.03-1.21); palpal stoutness 3.78 (3.46-4.27).

THORAX. — L_{th} 1.50 (1.34-1.65) mm, D_{th} 1.43 (1.31-1.60) mm. Antepronotum with medial commissure strong, not quite reaching to rear margin of phragma I, not surpassing scutal process; antepronotal notch slightly acute to right-angled, with medial corners rounded and well surpassing scutal process; LAS/side 12 (8-14); post-pronotum without setae but with 0-2 faint sensilla (?) on antero-dorsal border. Dorsocentrals uniserial to slightly staggered posteriorly; DCS/side 11 (8-14), $MaxL_{dcs}$ 162 (139-188); PAS/side 11 (6-14); ScS 23 (19-29), $MaxL_{scs}$ 191 (150-220); ASR 0.62 (0.60-0.66); 0-6 setae on epimeral II protuberance.

WING. — L_w 3.6 (3.4-3.9) mm, W_w 1.13 (1.00-1.21) mm. Dry wing not available. Slide mounted wing showing: costal projection 137 (119-178) or 7.2 (6.0-9.0) times its width; apparent m-cu distal to apparent fCu by about 2.4 times width of apparent m-cu; VR 0.93 (0.90-0.95); M_{3+4} weak. Remigium with 1 strong seta on hand, 0-1 weak seta and about 10-13 campaniform sensilla just beyond wrist, and 1-3 setae and 4 large and about 8 smaller campaniform sensilla on distal 0.5 of forearm. Setae 13 (8-16) on R, 9 (5-10) on R_1, and 5 (3-8) on R_{4+5} (uinserial and dorsal on all). Campaniform sensilla 3 ventrally on Sc just beyond arculus, 2 dorsally on R_1, 1 dorsally and 0 ventrally near base of R_{2+3}, and 2-4 dorsally on R_{4+5}. Squama with 25-43 strong setae, $MaxL_{sqs}$ 150-180 (n = 3).

LEGS. — $\bar{L}_{p_I}:\bar{L}_{tot}$ 1.05; Fe I apparently without postero-dorsal beard. Apical spur of Ti 1 long, slender, with sparse prickles on basal 0.2-0.3; apical spurs otherwise essentially as in *D. mendotae*. Polygon pattern on Ti III well developed. Ti III with posterior comb of about 13-23 spines arranged in a fairly regular row. Spiniform setae on first 3 tarsomeres of P I-III as follows: 2 (apical), 2 (apical), 0: 9-15, 2 (apical)-5, 0; 13-18, 6-9, 0-1 (at about 0.7). Lengths and ratios of leg segments as follows:

	Fe	Ti	Tm_1	$Tm_{2\text{-}5}$	LR	BV	SV
P_I	1460 (1310–1690)	1670 (1290–1960)	1140 (870–1330)	1180 (1010–1290)	0.68 (0.68–0.70)	3.62 (3.45–3.85)	2.76 (2.59–2.98)
P_{II}	1650 (1430–1930)	1590 (1330–1890)	800 (670–940)	960 (860–1040)	0.50 (0.47–0.52)	4.20 (4.00–4.57)	4.07 (3.87–4.32)
P_{III}	1880 (1650–2160)	1940 (1600–2300)	1320 (1040–1600)	1310 (1180–1410)	0.68 (0.65–0.69)	3.91 (3.64–4.29)	2.91 (2.79–3.11)

HYPOPYGIUM (without reference to *D. mendotae*). — Fig. 110. Tg IX with 22 (15-27) setae/side. Anal point absent; Tg IX very weak medially, appearing to be formed of two separate sclerites; L_{gncx} 350 (304-388); $\bar{L}_{tot}:\bar{L}_{gncx}$ 14. Basal plate weakly developed, with microtrichia ventrally, margin usually nearly straight distomedially. Medial field well developed, with sharply delimited dorsal border and with numerous microtrichia and setae; distal end of medial field not or only just slightly free. Gonostylus fairly broad, roughly of equal width throughout, with single subterminal peg and moderate terminal ridge. Sternapodeme somewhat broadened medially, fore margin convex, straight, or slightly concave medially. Basal wedge short but well-developed, rugose laterally.

DIAGNOSIS. — Antenna plumose, eyes not hairy; anal point absent; medial field well delimited dorsally. *D. aberrata* is similar but has an anal point and a more slender gonostylus.

MATERIAL EXAMINED. — *Alaska*, Anchorage, 24 Sept. 1964, K. Sommerman, jeep trap, 2 males (USNM); Anchorage-Seward Hwy. 25 Aug. 1964, K. Sommerman, jeep trap, 1 male (USNM); [*Austria*], TIROL, Igls, 2000 m., 25. VI. 1953, J. R. Vockeroth, 1 male (CNC); Obergurgl, TIROL, 1950 m., 16-VIII-1953, J. R. Vockeroth, 1 male (CNC); [*France*], massif du Taillefer, Alpes françaises, 15.6.67, 1 male, 2 pupal exuviae (UMn); *Manitoba*, The Bog near The Pas, 5.VII.1967, leg.

A. L. Hamilton and O. A. Saether, 1 male reared from pupa, 1 female (types of *D. fonticola*) (CNC); *Ontario*, Ottawa, Arboretum, C. E. F., 24-V-67, Jon Martin, 0.56.7, 1 male (JES); *Utah*, Salt Lake County, Big Cottonwood Creek at the water treatment plant, leg. A. V. Nebeker, 7 Nov. 1964, 3 males (ANSP); Summit Co., Stewart's Ranch, North Fork of Provo River, Coll. Gerald D. Brooks, II/20/54, 1 badly battered male without hypopygium (ANSP); *Washington*, Weyerhauser Company Expt. Station, 7-IX-65, slide No. S66-237, 1 male (JES); *Wyoming*, 41°20′N, 106°10′W, 3 mi NNW of Centennial, sweeping by Nash Fork of Little Laramie River, 23 March, 1968, leg. Dean Hansen, 2 males (UMn); as above, but found in (or in drift from) shallow (1-2″ deep) spring area at edge of river, 3 males reared from pupae (UMn); as above, but 24 March 1968, on rocks at splash line in small beaver pond by river, numerous pupal exuviae (UMn); 44°10′N, 107°05′W, Powder River Pass, 18 mi W, 13 mi S of Buffalo, alt 9,600′, sweeping in spruce-fir forest, 26, 27 Aug. 1967, 27 Aug. 1968, leg. D. Hansen, 9 males (UnM); [*Yukon Territories*], Whitehorse, Y. T., 12.VII.1949, L. R. Pickering, 1 male (CNC).

Discussion. — Walker (1856) described *Ch. incallidus* and *nexilis* from a single male each. The species remained unrecognizable for 73 years until Edwards (1929) examined Walker's material and figured the hypopygium of *incallida*. Edwards (1929) also synonymized *nexilis* with *incallida*. I have seen neither of Walker's types, but I am accepting Edwards' synonymy.

D. incallida has been recorded from several localities in Europe, and Roback (1957a) recorded it from Utah. Saether (1969) described *D. fonticola* from Manitoba and stated that Roback's record of *incallida* was incorrect. Saether (1969) states that his *fonticola* differs from *incallida* "in the placement of hairs on tergite IX and probably in the shape of the dististyle." At that time, as noted by Saether, *incallida* had not been adequately described. Serra-Tosio (1971), however, subsequently described *incallida* quite well, both in the adult and pupal stages, and he also sent me some specimens of *incallida* for examination. My specimens of *incallida* differ from european ones only in a few details. The range in AR runs higher and the lengths of the leg segments and the BV's are larger, but in nearly all other aspects the european and nearctic specimens are very similar. Saether (1969) states that the pupa of *fonticola* differs from that of *incallida* in lacking well-developed thorns on tergite II. Serra-Tosio (1971: 140, Pl. 52), however, shows only very small dorsal thorns on tergite II in european *incallida,* so the pupae, too, of *fonticola* and *incallida* are not distinctly separable. I am therefore synonymizing *fonticola* with *incallida.*

The specimen recorded by Roback (1957a) was in material borrowed from the ANSP. Unfortunately, however, the hypopygium was not with the specimen, so I must base a determination mainly on Roback's hypopygial figure. It seems fairly safe to say, however, that Roback's specimen was actually *incallida.*

LOCATION OF TYPE. — Holotype of *incallida* at the BM(NH) (Edwards, 1929).

Diamesa insignipes Kieffer

D. insignipes Kieffer, *in* Kieffer and Thienemann, 1908: 3 (described from female from Insel Ruegen, [now East] Germany); Thienemann, *in* Kieffer and Thienemann, 1908: 126-127 (description of pupa and pupal exuviae from Insel Ruegen); Thienemann, *in* Kieffer and Thienemann, 1908: 283 (records above specimens as cold water inhabitants of brooks, channels ("Rinnsalen"), and springs from the Halbinsel Jasmund from Ruegen); Thienemann, 1912a: 73 (cites above record); Thienemann, 1912b: 70 (cited in Thienemann, 1934: 7; not seen by author); Potthast, 1915: 355-356 (brief description of pupa); Thienemann, 1919a: 122 (pupa in key); Thienemann, 1926: 323 (in part) (cites records from Kieffer and Thienemann, 1908: 126-127; cites record from Kieffer, 1924: 54-55, which is probably not *insignipes*); Pagast, 1947: 478-479, 528-529, 574 (description of adult male and pupa; distribution from Germany; specimens seen included original material seen by Thienemann); Thienemann, 1950a: 146 (records (?) from "Ybbs, Ois"); Thienemann, 1952: 254 (larva in key; brief description); Thienemann, 1954: 177, 344, 347, 348, 354, 360, 364 (ecology, distribution of larva); Dittmar, 1955: 471, 475, 479, 480, 481 (records larvae, adults from Germany); Wuelker, 1959: 348-349 (briefly discusses identity of larva; records from Falkau, Germany, and northern Spain); Serra-Tosio, 1964: 44 (records numerous "stades preimaginaux" and 1 adult male from Mirable (Ardeche), France); Berczik, 1968a: 18, 19 (records from Hungary; figure of portions of pupa); Berczik, 1968b: 17 (records larvae, pupae from Hungary; description, figures of larva and pupa); Serra-Tosio, 1971: 214-220, Figs. 92, 93, 161 (description of adult male, male and female pupa; distribution; ecology).

D. prolongata Kieffer, 1909: 40-41 (described from male from Westphalia, Germany); Kieffer and Thienemann, 1909: 33 (records larvae on stones in a springbrook ("Quellbach") in Westphalia); Kieffer, 1911b: 19 (brief description of female); Thienemann, 1912a: 55, 73 (records mermithid parasitizing larva; records many larvae and pupal exuviae from algal pads on stones in strong current, adults reared in May, from the Sauerland, Germany); Thienemann, 1912b: 25, 37 (cited by Thienemann, 1934: 7; not seen by author); Potthast, 1915: 356-357 (description of larva and pupa); Thienemann, 1919a: 121, 122 (larva and pupa in key; states larva and pupa are indistinguishable from "*Psilodiamesa*" *spitzbergensis* Kieffer); Thienemann, 1919b: 32 (cited by Thienemann, 1934: 7; not seen by author); Edwards, 1929: 305 (brief description of male; figure of hypopygium; records from various localities in Gt. Britain); Goetghebuer, 1932: 183, 185, Fig. 313 (brief description of male; larva and pupa in key; records from Black Forest and Todtmoos, Germany); Goetghebuer, 1934: 88 (in list of species collected by Thienemann in Garmish-Partenkirchen); Thienemann, 1934: 7 (review of literature citations); Goetghebuer and Lenz, 1939: 14, Fig. 21 (brief description; figure of hypopygium).

D. sp. *insignipes-prolongata* Gr. Nietzke, 1937: 47, 70; tables facing 24, 58 (records from the Kossau, a stream in Germany).

[*non*] *D. insignipes* Kieffer, 1924: 54-55 (misdetermination of some *Diamesa* species); Goetghebuer, 1932: 183-184 (as above); Goetghebuer and Lenz, 1939: 13-14 (as above).

Brachydiamesa steinboeckii Goetg. Berg, 1948: 183 (misdetermination; records larvae from the muddy bottom of the River Susaa).

Description (unless otherwise stated, n = 3 and measurements are in microns): as in *D. mendotae* except:

TOTAL LENGTH. — 5.4 (5.1-5.7) mm.

COLORATION. — not noted.

ANTENNA (n = 1). — longest flagellar seta $0.60L_{fl}$; Flm_{13} with apical 0.27 spindle-shaped, mainly swollen ventrally; 2 short, slender setae dorso- and ventro-medially on Flm_1; long (MaxL 736) flagellar setae 1 on Flm_1, 3 on Flm_2, 9 on Flm_3, about 10 on Flm_4, increasing to 15 on Flm_{12}, numerous on Flm_{13}; setae only on basal 0.1 of spindle-shaped region of Flm_{13} except for 1 strong, isolated seta at 0.5 of spindle-shaped region which reaches apex of Flm_{13}; $\bar{L}_{flm_{1-13}}:\bar{W}_{flm_{1-13}}$ 98:63, 24:54, 27:51, 32:46, 32:44, 32:44, 34:41, 37:44, 39:41, 44:41, 46:41, 44:41, 686:39; AR 1.26; 1 preapical antennal seta; L_{pas} 51; D_{pd} 181, 185 (n = 2); 1 pedicellar seta ventro-medially; H_{sc} 194 (189-199) (n = 3).

HEAD. — W_h 700 (676-727); dorsal ocular apodeme strong, long; epistomal suture moderate to weak medially, moderate to absent laterally; IOS/side 6 (5-7); PtOS/side 12-16; inner verticals reaching to 0.62 (0.54-0.67) of distance from dorso-medial margin of eye to midline of vertex. CS 11 (8-13). Dorso-medial margin of eye extending not quite as far mesad as ventro-medial margin; H_e 312 (307-322). $\bar{L}_{ps_{2-5}}:\bar{W}_{ps_{2-5}}:\overline{MaxL}_{pss_{2-5}}$ 125:55:128, 174:58:97, 165:46:82, 226:36:37; D_{so} 19 (18-20); CP 1.02 (1.00-1.05); palpal stoutness 3.53 (3.45-3.59).

THORAX. — L_{th} 1.30 (1.26-1.34), D_{th} 1.33 (1.26-1.39) mm. Antepronotum with medial commissure strong, not quite reaching rear margin of phragma I, not surpassing anterior margin of scutal process; antepronotal notch slightly obtuse, with medial corners rounded and only moderately surpassing scutal process. LAS/side about 14 (n = 1). Dorsocentrals uniserial to slightly staggered posteriorly; DCS/side 13 (11-15) (n = 3), $MaxL_{dcs}$ 208 (n = 1); PAS/side 8 (5-11); ScS about 30, length not measurable on slides available. ASR 0.62 (0.61-0.64); 1-4 setae on epimeral II protuberance.

WING. — L_w 3.4-3.7 mm, W_w 1.12-1.19 mm. Dry wing not available. Slide mounted wing showing: costal projection 79-101 or 4.0-4.6 times its width; apparent m-cu distal to apparent fCu by about 1-4 times width of apparent m-cu; VR 0.90-0.95. Remigium with 1-2 fairly strong setae on hand, 0-1 weak seta and about 14 campaniform sensilla just beyond wrist, and 3 setae and 4 large and about 9 smaller campaniform sensilla on distal 0.5 of forearm. Setae 10-16 on R, 8-9 on R_1, and 9-14 on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 2-3 ventrally on Sc just beyond arculus, 2-5 dorsally on R_1, 0-1 dorsally and 1 ventrally near base of R_{2+3}, and 3-4 dorsally on R_{4+5}. Squama with about 36-56 strong setae, $MaxL_{sq}$, 188-202.

LEGS. — $\bar{L}_{p_I}:\bar{L}_{tot}$ 0.91; Fe I with moderate postero-dorsal beard of about 15-20 long setae. Apical spur of Ti I long, slender, with fairly numerous prickles on basal 0.3; L_{tispI} 64-74; apical spurs of Ti II stouter, particularly basally, subequal to equal in length, with numerous prickles on basal 0.4-0.5; L_{tispII} 48-55; apical spurs of Ti III with numerous prickles on basal 0.4-0.5; $L_{atispIII}$ 45-50, $L_{ptispIII}$ 76-86. Weak polygon pattern not visible near apex of Ti I; polygon pattern on Ti III very faint. Spiniform setae on first 3 tarsomeres of P I-III as follows: 4-10, 2 (apical)-7, 0; 9-13, 6-7, 0-3; 13-20, 6-9, 0-2 (at about 0.7). Lengths and ratios of leg segments as follows:

	Fe	Ti	Tm_1	Tm_{2-5}	LR	BV	SV
P_I	1530 (1450–1600)	1720 (1650–1760)	1110 (1050–1140)	1230 (1160–1300)	0.64–0.65	3.53 (3.47–3.58)	2.93 (2.90–2.95)
P_{II}	1670 (1720–1610)	1540 (1460–1630)	730 (690–770)	990 (910–1040)	0.47	4.00 (3.90–4.15)	4.49 (4.44–4.58)
P_{III}	1880 (1760–1960)	1820 (1760–1930)	1170 (1110–1210)	1280 (1190–1290)	0.64 (0.62–0.68)	3.82 (3.78–3.88)	3.16 (3.06–3.26)

HYPOPYGIUM (without reference to *D. mendotae*). — Fig. 138. Tg IX with 10-18 setae/side. Anal point strong, long, gradually broadening basally, apparently without or with only minute apical peg; strong apodemes on underside of Tg IX running first more or less parallel, then diverging and arching to antero-lateral corners of Tg IX; L_{gncx} 426-449; $L_{tot}:L_{gncx}$ 12. Gonocoxite very long. Basal plate weak, without microtrichia ventrally; medial field well developed, without microtrichia, with 2-4 very long, strong setae at about 0.4 its length and 2-4 long, strong setae at distal end; distal 0.7 of medial field free. Gonostylus very long, quite broad, distal 0.2 slightly expanded; gonostylus with small subterminal peg, without terminal ridge. Sternapodeme very broad medially, with weak antero-lateral projections; fore margin nearly straight to slightly concave medially. Basal wedge strong, long, rugose laterally.

DIAGNOSIS. — The long gonocoxite and gonostylus and slender, distally-free medial field are close to no other species.

MATERIAL EXAMINED. — *Wyoming,* Teton County, Snake River at Highway 22 west of Jackson, 6 March 1965, leg. A. V. Nebeker, 5 males (ANSP).

DISCUSSION. — *D. insignipes* has had quite a workout in the European literature. It was originally described from an adult female from northern Germany. Pagast (1947) figured the male hypopygium and synonymized *D. prolongata* Kieffer with *insignipes.* Both Pagast (1947: Abb. 40) and Serra-Tosio (1971: Pl. 92, Fig. 1) show a slight mound or protuberance on the medial side of the gonostylus at about half its length; this mound is nearly absent in my specimens. Serra-Tosio (1971: 215-216) described a European specimen of *insignipes;* it had slightly fewer interocular setae

(3, not 5-7) and slightly fewer dorsocentral setae (9, not 11-15) but it otherwise generally falls within the range of intraspecific variation I found in the 3 specimens I measured from Wyoming. Until I can see more specimens of all three stages showing clear differences with European populations, I shall regard the nearctic specimens as being conspecific with the European *insignipes*.

Location of type. — Pagast (1947: 574) examined pupal exuviae seen by Thienemann (in Kieffer and Thienemann, 1908). These apparently were destroyed in World War II (Thienemann, 1950c). I do not know the whereabouts of the female type described by Kieffer.

Diamesa leona Roback

D. leona Roback, 1957a: 7-8, 21 (described from 12 males from Utah; figures hypopygium, wing, antenna, palpus, tibial comb and spurs); Roback, 1959: 2 (records from Montana, notes mistake in leg and antennal ratios in original description).

D. pieta Roback, 1957a: 8-9 (described from 4 males, 1 female, from Utah). **New synonym.**

D. caena Roback, 1957a: 9 (described from 1 male, 1 female, from Utah). **New synonym.**

Description of macropterous form (unless otherwise stated, n = 5 and measurements are in microns): as in *D. amplexivirilia* except:

Total length. — 4.6 (3.9-5.3) mm (n = 8).

Coloration. — not noted.

Antenna. — Similar to Fig. 43. 8 flagellomeres, rarely with partial fusion of $Flm_{1\ \&\ 2}$ or $Flm_{4\ \&\ 5}$; non-plumose, longest flagellar seta (on Flm_8) 0.18 (0.16-0.19) L_{fl}; Flm_8 roughly cylindrical in basal 0.6-0.8, tapering beyond to blunt apex; flagellar setae short (MaxL 75-111), setae 3-6 on $Flm_{1\ \&\ 2}$, 3-5 on Flm_3, 0-1 on Flm_4, 0-3 on Flm_5, 0-1 on Flm_6, 0-2 on Flm_7, 4-6 on Flm_8. Antennal sensilla as follows (n = 2): large, blunt sensillum basiconicum 1 on Flm_{1-5}; slightly smaller, blunt sensilla basiconica 1-3 on $Flm_{1\ \&\ 2}$, 1-2 on Flm_3, 1 on Flm_4, 2 on Flm_5, 3-5 on Flm_6, 6-8 on Flm_7, apparently 1 on Flm_8 (the latter longer, more pointed, but arising from a distinct pit); long, pointed sensilla basiconica 6-11 on Flm_6, about 12-about 14 on Flm_7, numerous on Flm_8; ringed sensilla coeloconica 3 dorsal, 2-3 ventral on Flm_1, 1-2 dorsal, 1 ventral on Flm_2, 9-19(!) on Flm_8; small sensilla coeloconica 2-3 on Flm_1, 1 on $Flm_{2\ \&\ 3}$, 3-5 near apex of Flm_8. $\bar{L}_{flm_{1-8}}:\bar{W}_{flm_{1-8}}$ 101:41, 45:39, 38:36, 27:32, 28:36, 28:34, 34:38, 202:44; AR 0.64 (0.53-0-72); L_{pas} 28 (22-34); D_{pd} 82 (79-85); pedicellar setae absent; H_{sc} 83 (69-105); scape slightly weaker dorsally.

Head. — Simliar to head of brachypterous form, Fig. 55. W_h 594 (564-622); coronal suture moderate to weak, usually ending between tops of antennal sockets and lower ends of vertex projections over scapes, but occasionally weakly or interruptedly extending to between scapes, bifurcating very far back on dorsal region of vertex, with moderate to weak coronal apodeme; coronal triangle very small or apparently absent, not or only barely visible anteriorly; rear margin of vertex produced dorsad at midline to form small, clear, triangular or nearly rectangular nape; reduced ocelli fairly far apart, on or just above vertex projections over scapes, at or usually well below level of tops of antennal sockets; dorsal ocular apodeme absent or weak and nearly vertical; epistomal suture weak but usually reaching ATP's, often interrupted laterally; interocular setae easily distinguishable from inner verticals, in fairly well defined group centered 0.4-0.6 of distance from dorso-medial margin of eye to midline of vertex; IOS/side 6.5 (5-9); postocular setae in uniserial row running just behind rear margin of eye from near postero-ventral eye margin, row ending well or slightly below 3-5 longer, stronger outer vertical setae; PtOS/side 7-12; inner verticals fairly easily distinguishable from outer verticals, inner verticals shorter, more curved, and more decumbent, dispersed on vertex just dorsad and dorso-mesad to dorso-medial corner of eye; inner verticals not or only slightly occurring below dorsal margin of eye anteriorly, reaching to 0.44 (0.42-0.47) of the distance from dorso-medial margin of eye to midline of vertex; 2 medial vertex setae rarely present. CS 11 (5-15). Tentorium usually extending slightly or moderately beyond PTP. H_e 286 (262-311); ventral ocular apodeme very short and weak or absent. PS_1 with 0-4 setae, subglobose, nearly or as well sclerotized as other palpal segments (Fig. 57); $\overline{L}_{ps_{2-5}} : \overline{W}_{ps_{2-5}} : \overline{MaxL}_{pss_{2-5}}$ 71:57:47, 126:60:40, 108:50:33, 145:37:22; sunken organ more or less hemispherical, very prominent, at about 0.7 of PS_3; D_{so} 26 (20-32); CP 1.34 (1.17-1.52); palpal stoutness 2.19 (1.91-2.54). Cibarial pump wider than high, sides straight or slightly concave, cornua fairly long, slender, slightly arched (Fig. 59).

THORAX. — Figs. 75, 87. L_{th} 1.33 (0.97-1.53) mm (n = 8), D_{th} 1.16 (0.87-1.34) mm (n = 8). Antepronotum with medial commissure absent or very weak, if present extending anteriorly from fore margin of scutum; antepronotal notch varying from completely absent to acute to right-angled; medial corners varying from absent (i.e., fore margins of antepronotal halves are continuous medially) to fairly broadly rounded and well surpassing scutum; anterior margins of antepronotal halves fairly straight medially, arching back and then becoming concave antero-laterally; lateral antepronotal setae dispersed on prominently swollen lateral region; LAS/side 17 (11-about 23). Scutum in side view moderately flattened, not or only very slightly indented approximately above parapsidal suture, not extending beyond fore margin of antepronotum; scutal process weak, quite wide. Dorsocentral setae uniserial to staggered at anterior or posterior end of rows; DCS/side 10 (8-14), $MaxL_{dcs}$ about 115 (about 110-133); 1 acrostichal seta occasionally present. PAS/side 6 (5-9); scutal angle strong, rounded; parapsidal suture only weakly arched, with internal apodeme; humeral scar a tuberose area distinctly anterior to dorsal 0.3 of parapsidal suture; medial scutal scar running as a faint band from just behind scutal process to about midpoint of scutum, there expanding to form broader, pale scar which narrows and disappears at about ends of dorsocentral setae rows. Scutellar setae roughly in 2 rows; ScS 28 (22-34), $MaxL_{scs}$ 105-127 (n = 4). Medial cleft of postnotum not reaching weak postero-dorsal corner; postnotum with suture on midline postero-ventrally. Anteanepisternal pit small and weakly defined or absent; medio-anepisternum II occasionally not well delimited ventrally, usually somewhat sharply rounded ventrally; anapleural suture slightly weakened; ASR 0.56 (0.55-0.58); 0-2 setae on epimeral II protuberance, which is moderately developed; no other setae on epimeron II; 0-7 short setae on preepisternum II just below anapleural suture.

WING. — L_w 3.2 (2.9-3.6) mm, W_w 1.2 (1.1-1.2) mm. Outline as in Fig. 99. Wing margin usually slightly concave about at end of R_1, M_{3+4}, and Cu_1, slightly concave distal to anal lobe; anal lobe slightly obtuse to about right-angled; microtrichia visible as numerous, close points at 150×, seta-like projections just discernible at 650×; costal projection 85 (66-105) or 2.9 (2.5-3.3) times its width; Sc appearing as a sharp fold proximally, becoming very weak just distal to forking of R, ending before C. r-m strong, quite strongly arched, particularly proximally; vestige of ?R_5 appearing as faint, ill-defined band just anterior to distal 0.3 of M_{1+2}; vestige of ?M_2 appearing as faint, ill-defined band just posterior to distal 0.6-0.8 of M_{1+2}; apparent m-cu ranging from directly over apparent fCu to distal to apparent fCu by width of apparent m-cu; VR 0.99 (0.95-1.02). Remigium with 1 strong or 1 strong and 1 weaker seta on hand, 0-1 weak seta and about 8-15 campaniform sensilla just beyond wrist, and 1-3 setae and 3-4 large and about 8-10 smaller campaniform sensilla on distal 0.5 of forearm. Setae 11 (7-17) on R, 11 (7-15) on R_1, and 8 (3-12) on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 3-4 ventrally on Sc just beyond arculus, 1-2 dorsally on R_1, 1 dorsally and 1 ventrally near base of R_{2+3}, and 0 on R_{4+5}. Squama with 20-37 setae, $MaxL_{sqs}$ 73-110.

LEGS. — Legs very long, somewhat thicker than other species; $\overline{L}_{p_I}:\overline{L}_{tot}$ 1.55. Apical spur of Ti I short, basal 0.5 expanded, with numerous prickles on basal 0.7 (Fig. 106); L_{tispI} 45-52; apical spurs of Ti II stouter, basal 0.8 enlarged and covered with numerous fine prickles, distal 0.2 bare, tapering to a sharp point (Fig. 107); L_{tispII} 52-62; apical spurs of Ti III with fairly numerous prickles on moderately expanded basal 0.5-0.6, distal 0.5-0.4 tapering to a sharp point; $L_{atispIII}$ 55-62, $L_{ptispIII}$ 71-90; all apical tibial spurs with oval mark (sensory dome?) on basal 0.3-0.6. Ti III with posterior comb of 15-27 spines arranged in a fairly regular single row. Spiniform setae on first 3 tarsomeres of P I-III as follows: 2 (apical), 2 (apical), 2 (apical); 7-20, 2 (apical)-7, 2 (apical)-4; 11-27, 7-11, 1 (at about 0.4)-6. Tm_4 with cordiform condition much reduced; membranous, ventral sole not extending beyond latero-distal margin of Tm_4; articulation of Tm_5 distinctly proximal to apical margin of Tm_4, but dorso-lateral region of Tm_4 not at all constricted just before apex. Claws tapering slightly distally, with about 5 apical teeth (western specimens) or a pointed apex without teeth (Minnesota and New Brunswick specimens). Lengths and ratios of leg segments as follows:

I. Western specimens (n = 3):

	Fe	Ti	Tm_1	Tm_{2-5}	LR	BV	SV
P_I	1720–1830	1600–1630	820–860	890	0.51–0.53	4.65–4.77	3.95–4.16
P_{II}	1860–1990	1430–1500	540–570	720–740	0.36–0.40	5.39–5.44	5.82–6.45
P_{III}	1960–2160	1690–1720	890–910	960–1010	0.52–0.53	4.62–4.82	4.10–4.37

II. Minnesota and New Brunswick specimens (n = 2):

	Fe	Ti	Tm_1	Tm_{2-5}	LR	BV	SV
P_I	2270, 2300	2200, 2300	1310, 1340	1230, 1240	0.58, 0.60	4.73, 4.75	3.40, 3.43
P_{II}	2300, 2400	1930, 2030	920	970	0.46, 0.48	5.29, 5.49	4.57, 4.79
P_{III}	2430 2470	2370	1360 1390	1380, 1430	0.58, 0.59	4.31, 4.52	3.47, 3.53

Hypopygium (without reference to *D. amplexivirilia*). — Figs. 116, 117. Tg IX with about 8 to about 20 very short, fine setae/side. Anal point short, weakly sclerotized, directed ventrad, often not visible in slide mounts; apodemes not present on underside of Tg IX. L_{gnex} 566 (487-608); L_{tot}:L_{gnex} 8. Gonocoxite long, broad, with numerous short, anteriorly-directed setae; gonocoxite with slight broad ridge antero-dorsally. Basal plate weakly developed, slightly notched disto-medially. Medial field not or only very weakly developed, with no definite dorsal border. Gonostylus strong, with numerous short, proximally-directed setae; medial surface of gonostylus with fine "pile" of microtrichia. Sternapodeme very strong, produced to a point anteromedially. Basal wedge fairly short, small.

Diagnosis. — Short, near-vertical anal point; gonocoxites with short, anteriorly directed setae, gonostylus with "pile" on medial surface. Easily told from *D. leoniella* by its larger size and the structure of the anal point.

Material examined. — *Colorado,* 38°35'N, 106°04'W, 3.2 mi. S junction US 285 and Colo 291, 6 mi. NW Salida, on rocks at splashline, Arkansas River, 11 Dec. 1968, leg. D. Hansen, 5 macropterous males, about 15 macropterous females, about 10 brachypterous males, 7 male pupal exuviae (UMn); *Idaho,* Lemhi Co., Salmon River, Hwy. 93, 20 miles south of Salmon, 7 March 1965, leg. A. V. Nebeker, 2 males (ANSP); Lemhi County, Texas Creek, Hwy 28, 2 mi. south of Leadore, 7 March 1965, leg. A. V. Nebeker, 3 males (ANSP); Fremont-Teton Co. border, N. Fork Teton River at Hwy 32, 6 March 1965, leg. A. V. Nebeker, 5 males (ANSP); *Minnesota,* Cook Co., 2 miles N of Hovland on US 61, 2 June 1970, N. J. mosquito trap, leg. E. F. Cook, 1 male (UMn); *Montana,* Clark Fork River, Deep Creek, II/18/58, leg. Spindler, 3 battered males (ANSP); Clark Fork River, Sawmill Gulch, leg. Spindler, II/19/58, 14 males, 3 females (ANSP); W. Gallatin R., Gallatin Co., I-18-1948, R. Hays, 19 males, 1 female (USNM); *Nevada,* Reno, 6 Jan 1923, H. S. Barber, 3 males (USNM); [*New Brunswick*], Camp Adams, Northumb. Co., N. B., 5.VI.1962, J. Marshall, 2 males (CNC); [*New Mexico*], Taos Co. N. M., Rio Grande R. nr. San Cristobel, 14 Mar. 1954, J. M. Campbell, lot 59-1760-21, 1 male (USNM); *Quebec,* Hull, 7.V.1924, C. H. Curran, 2 males (CNC); *Utah,* Salt Lake County, various localities along Big Cottonwood Creek, Nov., Dec., 1964, Feb., March, June 1965, 7 macropterous, 4 brachypterous males, 10 females, leg. A. V. Nebeker (ANSP); Utah County, Diamond Creek at Hwy. 50-89, 31 Jan. 1965, leg. A. V. Nebeker, 4 males (UMn); Wasatch Co., Heber-Midway Bridge, II/13/54, coll. Gerald D. Brooks, 2 paratype males (1 lacks genitalia) (USNM), holotype male

(ANSP), holotype male of *D. pieta* Roback (ANSP), holotype male of *D. caena* Roback (ANSP), 2 males determined as *D. pieta* but not designated as paratypes (ANSP), 4 paratype males (ANSP); [*Washington*], Columbia R., 17.IV.1952, 10.IV. 1962, 22 pupal exuviae, 5 males (CNC); Columbia R., Hampton Brantford C., 6.III. 1952, 7.II.1962, 20 males, 8 females, 13 pupal exuviae (CNC).

Discussion. — Roback (1957a) described *D. leona, pieta,* and *caena* from about 20 specimens collected at the same site on two different dates. Roback separates the three species on variations in color and on the presence or absence of an anal point. Dr. Roback kindly loaned me the type material of all three of his species, and, after examining them, I concluded that they are all one species.

D. leona was described as being macropterous and having a short, postero-ventrally directed anal point (Roback, 1957a: 7-8, Figs. 20, 27). I examined the holotype (alcohol specimen, hypopygium not removed) and found the hypopygium essentially as in Fig. 116, although the anal point seems a little weaker than that illustrated in Fig. 117. Roback separated *pieta* from *leona* mainly on details of body coloration. An examination of the holotype of *pieta* (alcohol specimen, hypopygium not removed) shows that, while the coloration differences noted by Roback do exist, the holotype of *pieta* is simply a somewhat teneral specimen of *leona.* The legs, particularly the femora, are still slightly arched and have not completely sclerotized. The legs are still pale, and the hypopygium is brown only antero-laterally and medially. This coloration, however, is simply due to the specimen being teneral, and is certainly not a specific difference. I feel I am quite justified, therefore, to synonymize *pieta* with *leona.* Roback (1957a) separated *caena* from *leona* on the basis of the brachyptery and the absence of an anal point. The proctiger in the holotype of *caena* (again, an alcohol specimen, hypopygium not removed) is inverted into the abdomen, and the posterior margin of the ninth tergite is folded down and slightly forward, and, indeed, the anal point seems, at first glance, to be absent. A little teasing with a needle, however, clearly shows that *caena* has a weak anal point quite like that in *leona* and *pieta.* The wings are strikingly reduced and extend only as far as the end of the second abdominal tergite. This reduction, however, is simply the extreme in wing reduction; specimens I collected at the same site and at the same time in Colorado show intermediate stages between being fully macropterous and quite brachypterous (Figs. 99-101). Serra-Tosio (1971: 190, pl. 73) observed the same condition in the closely-related european *D. steinboecki* Goet. It seems to me, therefore, that *caena* is simply a brachypterous form of *leona,* and I am therefore synonymizing *caena* with *leona.*

The holotype of *caena* shows the same morphological changes in the thorax I illustrated from the other brachypterous specimens, i.e., the antepronotal sclerites broadly fuse medially (as in Fig. 88), preepisternum II is compressed (as in Fig. 76), and the anapleural suture is shortened (as in Fig. 76).

I have collected *leona* only once; this was in December in a fair-sized river (Fig. 34, 35). Emergence dates for specimens examined are from November to June.

A few macropterous specimens from Nevada deserve special comment. Folded and pinned with one of the specimens was a small hand-written note which read: "[R. C.] Shannon! - - - what are these fool flies? They run clumsily on rocks around which the river bubbles, but when they get to the surface of the water they dart skimming here and there, like Gyrinidae, except using their wings while their feet appear to trail the water surface. ♂ & ♀ same habits, skimming over rough swift water, - - - catchable only when running on stones. . . . Have never before seen this supposed Chironomid nor anything with similar life forms - - - Reno, Jan. 6, 1923, H. S. B[arber]." I have seen some female orthoclads skimming about in riffles like Barber describes, but never any *Diamesa.*

D. leona is quite similar to the european *steinboecki.* Serra-Tosio (1971) fully describes *steinboecki,* and it is clear that *leona* is not the same species. The hypopygium in *steinboecki* (Serra-Tosio, 1971: Pl. 75) has a fine, long, posteriorly-directed anal point, although in other characters it is quite close to *leona.*

The two specimens from Minnesota and New Brunswick differ from western specimens in LR, BV, and SV. They also lack the apical teeth on the tarsal claws.

The hypopygial figure of *D. leona* is reduced about 1.5 times more than that of *leoniella;* the hypopygium in *leona* is actually considerably larger than that of *leoniella.*

Location of types. — Holotypes of *D. leona, pieta,* and *caena* are at the ANSP; paratypes of these are at the ANSP and USNM. I would like to thank Dr. Roback again for letting me borrow these types and Dr. Serra-Tosio for sending me specimens of *D. steinboecki.*

Diamesa leoniella new species

Description (unless otherwise stated, n = 5 and measurements are in microns): as in *D. amplexivirilia* except:

Total length. — 3.7 (3.3-4.1) mm.

Coloration (alcohol specimens). — entire body light to dark brown; scutum darkest along dorsocentral setal rows and along midline, with lighter lateral and antero-medial stripes; haltere knob and shaft white, base slightly light brown.

ANTENNA. — 8 flagellomeres, rarely with partial fusion of $Flm_{1\,\&\,2}$ or $Flm_{6\,\&\,7}$; non-plumose, longest flagellar seta (on Flm_8) 0.16-0.17L_{fl}; $Flm_{2\,\&\,3}$ irregularly fusiform, Flm_{4-7} subglobose, Flm_8 cylindrical in basal 0.8-0.9, tapering beyond to blunt apex; flagellar setae short (MaxL 73-88), setae 4-8 on Flm_1, 0-5 on Flm_{2-3}, 0-4 on Flm_4, 1-3 on Flm_5, 0-1 on Flm_6, 0-3 on Flm_7, 5 on Flm_8; whorl of setae at about 0.7 of Flm_1 (often with 1-2 additional setae at about 0.5), at 0.3-0.5 of Flm_{2-7}, at 0.1 of Flm_8. Antennal sensilla as follows (n = 2); large, blunt sensillum basiconicum 1 on Flm_{1-7}; slightly smaller, blunt sensilla basiconica 1-2 on Flm_1, 2-5 on Flm_2, 5-7 on Flm_3, 6-8 on Flm_4, 7 on Flm_5, 5-7 on Flm_6, 5-8 on Flm_7, 2 on Flm_8: long, pointed sensilla basiconica 0-1 on $Flm_{4\,\&\,5}$, 2-3 on Flm_6, 3-7 on Flm_7, very numerous on Flm_8; ringed sensilla coeloconica 2 on Flm_1, 1 on Flm_2, 0-1 on Flm_3, 3-4 on Flm_8; small sensilla coeloconica 2 on Flm_1, 1 on Flm_2, 0-1 on Flm_3, 3 near apex of Flm_8. $\overline{L}_{flm_{1-8}}:\overline{W}_{flm_{1-8}}$ 98:35, 35:33, 34:32, 26:31, 27:31, 26:32, 25:32, 117:38; AR 0.59 (0.48-0.74); 2 (occasionally 1) subequal preapical antennal setae; length of longer PAS 34 (27-39); D_{pd} 76 (68-85); pedicellar setae absent; H_{sc} 65 (59-73); scape with microtrichia and sometimes with single dorso-lateral seta; dorsal or dorso-lateral region of scape sometimes poorly sclerotized.

HEAD. — Fig. 54. W_h 456 (426-502); coronal suture usually completely absent, occasionally with just a short trace at level of vertex projections over scapes; coronal triangle absent; vertex not sunken dorso-medially; vertex with usual 4 short setae in large, clear sockets dorso-medially; rear margin of vertex produced dorsad at midline to form small, clear, triangular or rectangular nape; reduced ocelli fairly far apart, on or just above vertex projections over scapes, slightly to well below level of tops of antennal sockets; epistomal suture moderate, complete or interrupted laterally; interocular setae easily distinguishable from inner verticals, forming fairly distinct group centered at 0.4-0.5 of distance from dorso-medial margin of eye to midline of vertex: IOS/side 4 (3-6); postocular setae in uniserial or slightly staggered row running just behind posterior margin of eye from near postero-ventral eye margin to merge with about 2-4 longer and much stronger outer vertical setae; PtOS/side 6-9; inner and outer verticals not well differentiated, both strong, stout, dispersed on vertex dorsad and dorso-mesad to dorso-medial corner of eye; inner verticals occurring well below dorsal margin of eye anteriorly, reaching to 0.31-0.50 of distance from dorso-medial margin of eye to midline of vertex. CS 4 (2-8). Tentorium not swollen antero-laterally at base, with weak to moderate postero-medial basal projection; tentorium weakly or not at all extending past PTP. Eyes with dorso-medial margin broadly truncate to broadly rounded; H_e 218 (203-227); ventral ocular apodeme absent or very small. PS_1 with 0-2 setae, subglobose or squatly cylindrical, about as well sclerotized as other palpal segments; $\overline{L}_{ps_{2-5}}:\overline{W}_{ps_{2-5}}:\overline{MaxL}_{ps_{2-5}}$ 69:42:53, 105:44:45, 92:35:41, 132:26:19; D_{so} 18-20; CP 1.18 (1.10-1.24); palpal stoutness 2.64 (2.34-2.84). Cibarial pump wider than high, sides straight or slightly concave, with fairly long, slender, pointed cornua.

THORAX. — Fig. 86. L_{th} 1.01 (0.95-1.11) mm, D_{th} 0.90 (0.87-0.97) mm. Antepronotum with medial commissure absent; antepronotal notch ranging from very short, acute, and beginning behind fore margin of scutum, to right angled to sometimes partially obliterated by fusion of antepronotal lobes; medial corners ranging from nearly obliterated to obtuse, scarcely or not surpassing anterior margin of antepronotum; lateral antepronotal setae dispersed medially, region of lateral setae strongly swollen; LAS/side 14 (10-17). Scutum in side view flattened, indented approximately above parapsidal suture and again just before anterior end of scutum, usually extending beyond fore margin of antepronotum. DCS/side 6 (1-9) (note range!), $MaxL_{dcs}$ 91 (79-99); short but strong, decumbent acrostichal setae often present, about at midpoint of scutum, at anterior end of broadening of medial scutal scar; AcS 0-5. Prealar setae strong, stout, in rather long, staggered row on posterodorsal region of prealar callus; PAS/side 6 (3-7); scutal angle strong, rounded; parapsidal suture fairly straight, with internal apodeme; humeral scar an irregular tuberose area anterior to dorsal end of parapsidal suture; medial scutal scar faint or absent anteriorly, expanding at about the midpoint of scutum, disappearing at end of DCS rows. Scutellar setae dispersed or in 3 irregular rows; ScS 22 (17-32) (n = 5), $MaxL_{scs}$ 89-109 (n = 3). Medial cleft of postnotum absent or very short; postnotum with suture on midline posteriorly and with rounded or slightly angled posterodorsal margin. Anteanepisternal pit a small but fairly well defined oval; medioanepisternum II somewhat narrowed and pointed ventrally, usually not completely delimited from anteanepisternum; ASR 0.48 (0.44-0.52); setae on epimeral II protuberance absent, protuberance weak, broadly rounded; no setae elsewhere on epimeron II; 0-3 (usually 1) short setae just below anapleural suture on preepisternum II.

WING. — L_w 2.5 (2.4-2.6) mm, W_w 0.84 (0.78-0.92) mm. Outline as in Fig. 99. Wing margin usually slightly concave at or just beyond end of R_1, at end of M_{3+4}, and proximal to end of Cu_1, straight or slightly concave distal to anal lobe; anal lobe slightly obtuse. Dry wing not available. Slide mounted wing showing: marginal setal fringe in 2 rows along proximal 0.2 of C, becoming more or less in 3 or even 4 rows on distal 0.8 of C, then becoming more or less alternating long-short past distal end of costa, longest on anal lobe. Costal projection 51 (30-67) or 2.1 (1.2-2.8) times its width; r-m strong, slightly to moderately arched, mainly arched proximally; base of r-m distal to apparent m-cu by about width of r-m. Vestige of ?R_5 appearing as faint, diffuse, ill-defined band just anterior to distal 0.3 of M_{1+2}; vestige of ?M_2 appearing as faint, diffuse, ill-defined band just posterior to distal 0.6 of M_{1+2}; VR 0.95 (0.92-0.99). Remigium with 1 strong or 1 strong and 1 weak seta on hand, 0-1 weak seta and about 8-14 campaniform sensilla just beyond wrist, and 2 setae and 2-4 large and about 6-8 smaller campaniform sensilla on distal 0.5 on forearm. Setae 11 (8-14) on R, 11 (9-13) on R_1, 14 (10-16) on R_{4+5}, and occasionally 1 on r-m. Campaniform sensilla 2-3 ventrally on Sc just beyond arculus, 1 dorsally on R_1, 1 (occasionally 0) dorsally and 1 ventrally near base of R_{2+3}, and 0 on R_{4+5}. Squama with 12 (8-15) setae, $MaxL_{sqs}$ 68 (50-85).

LEGS. — Spiniform setae on first 3 tarsomeres on P I-III as follows: 2 (apical), 2 (apical), 2 (weak, apical); 10-13, 4-7, 2 (apical)-4; 12-22, 7-10, 2 (apical)-4. Tm_4 only slightly cordiform, with slightly swollen, membranous, apical sole ventrally; articulation of Tm_5 distinctly proximal to apical margin of Tm_4, but dorso-lateral region of Tm_4 only slightly or not at all constricted just before apex. Lengths and ratios of leg segments as follows:

	Fe	Ti	Tm_1	$Tm_{2\text{-}5}$	LR	BV	SV
P_I	1770 (1660–1890)	1780 (1680–1930)	1140 (1010–1240)	1140 (1090–1220)	0.64 (0.60–0.66)	4.10 (4.03–4.19)	3.12 (3.01–3.37)
P_{II}	1840 (1720–1990)	1560 (1500–1720)	800 (760–870)	880 (820–1030)	0.50 (0.49–0.51)	4.17 (3.93–5.14)	4.30 (4.20–4.37)
P_{III}	1920 (1830–2060)	1860 (1720–2010)	1140 (1090–1210)	1230 (1160–1360)	0.61 (0.60–0.63)	3.99 (3.79–4.16)	3.32 (3.25–3.42)

Hypopygium (without reference to *amplexivirilia*). — Fig. 118. Tg IX with 10 (6-13) setae/side. Anal point fairly short but strong, wedge-shaped, without apodemes on underside of Tg IX; anal point with numerous coarse microtrichia on basal 0.5. L_{gncx} 400 (384-421); $\bar{L}_{tot}$:$\bar{L}_{gncx}$ 9. Basal plate weakly developed, with distinct disto-medial projection. Medial field only weakly developed; gonocoxite with moderate ridge dorso-medially. Gonostylus with numerous, short, proximally-directed setae; medial surface of gonostylus with fine "pile" of microtrichia. Sternapodeme very strong, produced to a point antero-medially. Basal wedge fairly well developed, rugose laterally.

Diagnosis. — Fairly strong anal point, gonostylus with "pile" on medial surface.

Material examined. — *California,* Convict Creek, 7,200', 13 Feb. 1963, H D Kennedy, *Diamesa leona* Roback ♂ [det. ?], 1 male (USNM); *Montana,* Glacier National Park, Logan Creek at Going to the Sun Highway, 5,800', light trap, 23 July 1968, leg. Ron Hellenthal, 40 males; as above, but drift net in Logan Creek, 3 males (UMn); *Utah,* Daggett County, Sheep Creek cave stream at jct. with Sheep Ck., 7 mi. above jct. with Green R., IV-3-65, A. V. Nebeker, 1 male (UMn); Salt Lake County, various localities along Big Cottonwood Creek, Nov., Dec., 1964, Jan., Feb., March, April, June 1965, about 70 males, 8 females (ANSP); [*Washington*], Columbia R., 2.V.1952, 24.VI.1952, 14 pupae, 3 males (CNC); *Wyoming,* 44°58'26"N, 109°33'12"W, alt. 9,640', 32 mi. N, 24 mi. W of Cody, small stream feeding unnamed lake, water 14°C., 9 Aug. 1969, leg. Dean Hansen, 42 males, 8 females, about 12 pupae in silk and sand cases, many larvae (UMn); 44°57'50"N, 109°29'12"W, alt. 10,300', 31 mi. N, 21 mi. W of Cody, small steep stream feeding Frozen Lake, 13 Aug. 1969, leg. Dean Hansen, 3 males (UMn).

Discussion. — *D. leoniella* has some noteworthy morphological characters. First, it is the only *Diamesa* I have come across which often has a dorso-lateral seta on the scape. It also often has one or two setae on the first palpal segment, and the coronal suture is completely absent in most specimens (Fig. 54). *D. leoniella* is also the only *Diamesa* I know of which often has at least one acrostichal seta (one specimen had five). One specimen had only one dorsocentral seta on one side, so I think it's possible that an occasional specimen could have no dorsocentrals and yet have one or more acrostichals.

Most of the adults of *leoniella* I collected were taken by turning over rocks at the edge of or just in the stream shown in Fig. 32. The adults were often found in congregations on the protected sides of rocks, just above the splash line.

LOCATION OF TYPE. — The holotype is an adult male I collected in the Bear Tooths in Wyoming (44°58′26″N, 109°33′12″W, alt. 9,640′, 32 mi. N, 24 mi. W of Cody. Small stream feeding unnamed lake, water 14°C., 9 Aug. 1969, leg. Dean Hansen, under rocks in stream, slide DH70-97). The other specimens examined are designated as paratypes and are returned to their respective institutions.

Diamesa lindrothi Goetghebuer

D. lindrothi Goetghebuer, *in* Goetghebuer and Lindroth, 1931: 279, 281 (described from males and females from Iceland; description, figure of hypopygium); Edwards, 1935: 471 (records 1 male, 1 female from Lake Fjord, East Greenland); Thienemann, 1941: 66, 68, 70, 78, 79, 82, 148, 188-189 (larvae and pupae from Norway and Swedish Lappland); Pagast, 1947: 473, 474-475; Abb. 32; 523-524, 550, 551, 572, 579, 580, 591 (description of adult male, possible female pupa, discussion of "species pairs"); Thienemann, 1950b: 542, 543, 564, 565 (distribution from the literature); Thienemann, 1952: 253 (larva, with fair description, in key); Thienemann, 1954: 23, 31, 44, 45, 46, 48, 344, 346, 355, 357 (ecology of larvae); Wuelker, 1959: 355 (mention of *lindrothi* in discussion of zoogeography); Styczynski, B. and S. Rakusa-Suszczewski, 1963: 329, 330, 331, 333-334 (description, habitat of larvae from Spitsbergen); Serra-Tosio, 1964: 40, 41, 42 (discussion of *latitarsis* group); Serra-Tosio, 1966: 124, 125, 126 (records from French Alps, showing *lindrothi* is indeed boreoalpine in distribution); Serra-Tosio, 1967b: 78-81 (description of male adult and pupa; figure of hypopygium; distribution; ecology of larva); Saether, 1968: 456 (records from Finse area, Norway; brief description, figure of hypopygium); Serra-Tosio, 1969a: 205 (records 2 males from Swedish Lapland, in Brundin collection); Steffan, 1971: 477, 480, 483, 484, 485 (distribution, ecology of larvae in glacial streams in northern Scandinavia); Serra-Tosio, 1971: 174-178, Figs. 61.8, 64.8, 65.3, 65.9, 65.15, 68.3, 69.3, 156, 173 (distribution, description of male adult and pupa).

[?] *Brachydiamesa sp. II.* Thienemann, 1936: 206-207 (description of larvae from Partenkirchen; possibly *latitarsis, fide* Pagast, 1947: 473); Thienemann, 1937b: 2-3 (records larvae from standing and flowing water in East Greenland; possibly *latitarsis, fide* Pagast, 1947: 473).

Description (unless otherwise stated, n = 4 and measurements are in microns): as in *D. mendotae* except:

TOTAL LENGTH. — 3.4 (3.0-3.7) mm (n = 5).

COLORATION. — not noted before slide mounting.

ANTENNA. — longest flagellar seta 0.63 (0.56-0.69)L_{fl}; $Flm_{2\text{-}4}$ moderately fusiform, Flm_{5-12} progressively become less fusiform, but Flm_{12} usually at least slightly fusiform; Flm_{13} with apical 0.29-0.37 spindle-shaped, mainly swollen ventrally; 0(?)-2 short, slender setae dorso- and ventro-medially on Flm_1; long (MaxL 515-687) flagellar setae 0-1 on Flm_1, 2-3 on Flm_2, about 6 on Flm_3, about 9 on Flm_4, increasing to 11-13 on Flm_{12}, numerous on Flm_{13}; setae on basal 0.2-0.3 of spindle-shaped region of Flm_{13}; medial seta-free area reduced, extending only to $Flm_{10 \text{ or } 11}$, not infolded in slides available; 1 small, blunt sensillum basiconicum/flagellomere ventrally at least on $Flm_{2 \& 3}$, possibly present on Flm_1 but not visible in slides available; spindle-shaped region of Flm_{13} with numerous slender, pointed sensilla basiconica, but apparently without or with only 1 blunter, shorter sensillum basiconicum arising from more distinct pit, and with 4-5 ringed sensilla coeloconica; $\overline{L}_{flm\,1-13} : \overline{W}_{flm\,1-13}$ 73:41, 21:39, 26:37, 30:35, 34:34, 37:33, 38:31, 41:31, 45:29, 45:27, 44:28, 47:28, 417:26; AR 0.82 (0.75-0.86); 1 preapical antennal seta; L_{pas} 30 (26-34); D_{pd} 142 (137-152); 2-3 pedicellar setae ventromedially; H_{se} 144 (133-155).

HEAD. — W_h 528 (499-564); interantennal bar thin, weak, but still complete; epistomal suture moderate medially, only slightly weaker laterally; IOS/side 2-4; postocular setae ranging from 3-5/side, running uniserially just mesad to ventral 0.5 of rear margin of eye, to about 8-10/side, running more or less uniserially to almost merge with about 3 stronger, longer outer verticals; inner vertical setae few, shorter. weaker, more curved and decumbent than outer verticals, running roughly in row or slightly dispersed on antero-dorsal region of vertex; inner verticals reaching to 0.61 (0.53-0.78) of distance from dorso-medial margin of eye to midline of vertex. CS 6 (4-7). Tentorium moderately swollen antero-laterally at base, not or only very slightly swollen at PTP, extending well beyond PTP. Eyes not hairy, microtrichia visible medially as minute points at antero-medial margin, not visible laterally; dorso-medial margin extending not quite as far mesad as ventro-medial margin; H_e 231 (213-254); ventral ocular apodeme moderate, more slender and weaker than in other species. PS_1 without setae, subglobose, nearly as well sclerotized as other palpal segments; $\overline{L}_{ps\,2-5} : \overline{W}_{ps\,2-5} : \overline{MaxL}_{pss\,2-5}$ 65:34:75, 112:40:67, 123:29:35, 156:23:25; sunken organ inconspicuous, at about 0.7 of PS_3; D_{so} 12 (10-14); CP 1.16 (1.10-1.25); palpal stoutness 3.61 (3.30-3.87).

THORAX. — L_{th} 1.00 (0.80-1.09) mm, D_{th} 0.98 (0.88-1.02) mm. All thoracic sclerites covered with very fine microtrichia. Antepronotum with medial commissure strong, not quite reaching rear margin of phragma I, reaching to or slightly surpassing anterior margin of scutal process; antepronotal notch right-angled or obtuse, with medial corners broadly rounded and only slightly to moderately surpassing scutal process; LAS/side 6 (4-7). Post-pronotal apophyses slender, moderately developed. Dorsocentrals uniserial; DCS/side 9 (7-11) (n = 4), $MaxL_{dcs}$ about 150 (n = 2); 1 specimen with 1 well-developed acrostichal seta at about 0.25 length of scutum; PAS/side 6 (4-8); medial scutal scar faint, interrupted anteriorly, otherwise as in *D. mendotae;* scutellar setae dispersed or very roughly in 2 rows, ScS about 20, $MaxL_{scs}$ not measurable in slides available. Postnotum with well-developed medial cleft, postnotum viewed laterally with smoothly rounded postero-dorsal margin. Medioanepisternum II usually not or sometimes only very weakly delimited ventrally; ASR 0.62-0.64 (n = 3); 0 or 1 fine seta on epimeral II protuberance.

WING. — L_w 2.20-2.77 mm, W_w 0.78-0.92 mm. Rear margin only very slightly concave proximally, anal lobe broadly rounded and about right-angled. Dry wing not available. Slide mounted wing showing: microtrichia visible as numerous, fine, close points at 150×, as very short hair-like projections arising from minute points or dots at 650×. Costal projection fading gradually, roughly 36-60, or 3-6 times its width; R_1 not or only slightly enlarged distally. R_{2+3} fairly strong proximally, distal 0.3 becoming very faint, proximal 0.4 running slightly closer to R_{4+5} than to R_1;vestige of ?M_2 just barely visible just posterior to distal 0.8-0.9 of M_{I+2}; VR 0.92-0.94. Remigium not visible in slides available. Setae 9-17 on R, 10-13 on R_1, and 3-5 on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 3 ventrally on Sc just beyond arculus, 1 dorsally on R_1, 1 dorsally and 1 ventrally near base of R_{2+3}, and 0 on R_{4+5}. Squama (n = 2) with about 16-20 setae, $MaxL_{sqs}$ 76-129.

LEGS. — $\bar{L}_{p_I}:\bar{L}_{tot}$ 1.10; Fe I with postero-dorsal beard not visible in slides available. Apical spur of Ti I long, slender, with sparse prickles on basal 0.4; L_{tispI} 57-69; apical spurs of Ti II stouter, subequal in length, with fairly numerous prickles on basal 0.4-0.5; L_{tispII} 38-48, 45-55; apical spurs of Ti III with somewhat sparse to fairly numerous prickles on basal 0.4-0.6; $L_{atispIII}$ 40-55, $L_{ptispIII}$ 64-79. Weak polygon pattern not visible near apex of Ti I; polygon pattern on Ti III very weak. Ti III with posterior comb of about 10-12 spines arranged in a single regular row. Spiniform setae on first 3 tarsomeres of P I-III as follows: 0-2 (apical), 0, 0; 2 (apical)-5, 2 (apical), 0-1 (at about 0.5); 3-7, 2 (apical), 0. Lengths and ratios of leg segments as follows:

	Fe	Ti	Tm_1	Tm_{2-5}	LR	BV	SV
P_I	1000 (890–1140)	1110 (1000–1190)	810 (750–860)	807 (720–870)	0.73 (0.71–0.75)	3.63 (3.56–3.65)	2.60 (2.50–2.73)
P_{II}	1190 (940–1210)	1020 (900–1130)	490 (450–540)	590 (530–640)	0.49 (0.47–0.50)	4.37 (4.20–4.50)	4.28 (4.13–4.34)
P_{III}	1220 (1080–1380)	1220 (1090–1290)	770 (710–820)	770 (690–860)	0.64 (0.60–0.65)	4.18 (4.06–4.28)	3.16 (3.04–3.28)

HYPOPYGIUM (without reference to *D. mendotae*). — Fig. 137. Tg IX with 3-6 setae/side. Anal point slender, broadening basally, usually with short apical peg set in small depression; strong apodemes on underside of Tg IX diverging and arching slightly to antero-lateral corners of Tg IX; L_{gncx} 250 (243-267); $\bar{L}_{tot}:\bar{L}_{gncx}$ 14. Basal plate scarcely developed. Medial field not developed. Gonocoxite with finger-like, setous projection present just posterior to basal foramen and stronger basi-medial projection with several very stout setae. Gonostylus fairly long, slender, with single subterminal peg and minute terminal ridge. Sternapodeme a simple slender arch. Basal wedge fairly well developed, rugose.

DIAGNOSIS. — Antenna plumose, eyes not hairy; gonocoxite with finger-like appendage and stronger appendage basi-medially. No other nearctic *Diamesa* has similar appendages. Other related European species are described in Serra-Tosio, 1967b.

Material examined. — *Austria*, Obergurgl, TIROL, 1950m, 8, 25-VIII-1953, J. R. Vockeroth, 5 males (CNC); *East Greenland*, Lake Fjord, 66.17.N, 34.59.W., 16.VIII.1933, F. S. Chapman, B. M. 1933-645, 1 male (BMNH).

Discussion. — *D. lindrothi* is the only member of the *latitarsis*-group, i.e., *latitarsis, goetghebueri, lindrothi, modesta, wuelkeri*, and *laticauda* (Serra-Tosio, 1967b), reported thus far from the Nearctic. I never collected the species; the only nearctic specimen I saw was that recorded from East Greenland by Edwards (1935).

Location of type. — Unknown to me.

Diamesa mendotae Muttkowski

D. mendotae Muttkowski, 1915: 116-122 (described from larvae, pupae, and adults from creeks feeding Lake Mendota, Wisconsin); Johannsen, 1921: 230, 231, 232 (adults and larvae in key; brief description of larvae); Johannsen, 1952: 13 (as possible junior synonym of *D. nivoriunda* (Fitch)).

Description (unless otherwise stated, n = 5 and measurements are in microns):

Total length. — 5.0 (4.2-6.0) mm.

Coloration (pinned specimen). — head and thorax dark gray, pruinose; scutal stripes darker, less pruinose, particularly when viewed antero-dorsally. Legs and abdomen dark gray-brown; hypopygium dark gray. Haltere base and much of shaft brown; capitellum light brown to nearly white.

Antenna. — Figs. 36, 37, 39. 13 flagellomeres, plumose; longest flagellar seta 0.61 (0.54-0.66)L_{fl}; distal 0.5 of Flm_1 slightly swollen, particularly ventrally, Flm_1 with basal nipple; Flm_{2-3} slightly fusiform, Flm_{4-12} progressively becoming cylindrical; Flm_{13} usually evenly tapering very slightly toward apex; Flm_{13} with apical 0.15-0.20 spindle-shaped, mainly swollen ventrally; 1-3 short, slender setae dorso- and ventro-medially on Flm_1; short setae becoming more numerous (to maximum of about 5 on Flm_3) and progressively longer and stronger on following Flm's until indistinguishable from long setae by $Flm_{6 \text{ or } 7}$; long (MaxL 520-950) flagellar setae 0-1 on Flm_1, 2-7 on Flm_2, 6-12 on Flm_3, increasing to 13-15 on Flm_{12}, numerous on Flm_{13}; on Flm_{13} setae longest proximally, diminishing in length to about 120 long near apex; setae not on or only on basal 0.2 of spindle-shaped region of Flm_{13}; antennal plume not reaching apex of Flm_{13}; long setae in irregular whorl on Flm_2, in 2 irregular whorls on Flm_{3-12}, dispersed on Flm_{13}; antennal furrow extending from Flm_1 to apex of Flm_{13}, usually infolded from Flm_5 to just before apex of Flm_{13}; medial seta-free area extending from Flm_1 to Flm_{12}, not infolded; 1 blunt sensillum basiconicum/flagellomere just ventral to antennal furrow on Flm_{1-5} (appearing as clear spot under bright field); 1 slightly smaller, blunt sensillum basiconicum/flagellomere ventrally on Flm_{1-3}; small sensilla coeloconica 2 ventrally on Flm_1, 1 ventrally on $Flm_{2 \& 3}$; 1 ringed sensillum coeloconicum dorsally, 1 ventrally on Flm_1, 1 dorsally on Flm_2; spindle-shaped region of Flm_{13} with about 20-35 slender, pointed sensilla basiconica, about 3-5 blunter, shorter sensilla basiconica arising from more distinct pits than the preceding, and about 4 ringed sensilla coeloconica; 3-5 small sensilla coeloconica (Fig. 42) at very apex of Flm_{13}. $\overline{L}_{flm\,1\text{-}13} : \overline{W}_{flm\,1\text{-}13}$ 100:64, 23:

55, 24:54, 25:50, 23:47, 25:46, 25:45, 26:46, 28:46, 29:44, 32:45, 34:43, 904:41; AR 2.06 (1.98-2.15); 1 (rarely 2) preapical antennal seta; L_{pas} 49 (42-59); pedicel (Fig. 36) globose, with fine microtrichia; D_{pd} 188 (173-200); 1 (rarely 2) pedicellar seta ventro-medially; 1 campaniform sensillum (Fig. 5) dorsally at ridge of indentation for Flm_1; scape ring-like, complete, with articulation to pedicel ventro-medially and dorso-laterally (Fig. 48); H_{sc} 205 (180-221); scape without setae or microtrichia.

HEAD. — Figs. 48, 49. W_h 719 (666-768); coronal suture strong, reaching to antennal sockets, bifurcating well before rear margin of vertex, with strong coronal apodeme; vertex slightly sunken at arms of coronal suture; 4 short, stout coronal setae in large, clear sockets on coronal triangle; rear margin of coronal triangle produced dorsad at midline to form small, triangular nape; vertex well delimited from antennal sockets, slightly produced medially toward frons, not projecting anteriorly over scapes; dorsal ocular apodeme (Fig. 6, 54) absent to moderate; reduced ocelli close together, at antero-medial margin of vertex; inter-antennal bar strong, continuous with coronal suture and frons; frons fairly well delimited from antennal sockets; epistomal suture strong medially, usually weaker laterally; interocular setae in distinct group centered near dorso-medial margin of eye; IOS/side 5 (3-7); postocular setae in uniserial row running from near postero-ventral margin of eye dorsally to merge with about 6 stronger, longer outer vertical setae (Fig. 49); PtOS/side 10-16; inner vertical setae shorter, weaker, more curved and decumbent than outer verticals, dispersed on dorsal region of vertex; inner verticals reaching to 0.33-0.62 of distance from dorso-medial margin of eye to midline of vertex; no vertex hump behind eye. Clypeus slightly swollen anteriorly, slightly wider than long (Fig. 48); clypeal setae dispersed; CS 10 (5-14). Labrum not sclerotized. Tentorium (Fig. 60) swollen antero-laterally at base, slightly swollen at PTP, extending moderately beyond PTP. Eyes hairy, microtrichia about twice height of ommatidial lens; dorso-medial margin truncate, dorsal corner rounded; dorso-medial margin extending about as far mesad as ventro-medial margin; H_e 324 (298-350); ventral ocular apodeme very prominent (Figs. 48, 60); antennifer present (Fig. 60). Palpus 5-segmented; PS_1 (Figs. 48, 51) without setae, subglobose, slightly less well sclerotized than other palpal segments; PS_{2-5} setous (longest setae laterally), PS_3 slightly swollen disto-medially; $\overline{L}_{ps_{2-5}} : \overline{W}_{ps_{2-5}} : \overline{MaxL}_{pss_{2-5}}$ 102:45:119, 167:53:107, 141:45:97, 216:35:32; sunken organ (Figs. 7-9) prominent, at about 0.7 of PS_3; D_{so} 18 (16-20); all palpal segments with grouped microtrichia; CP 1.13 (1.09-1.19); palpal stoutness 3.59 (3.42-3.76). Cibarial plate rectangular, with fairly long, slender cornua (Fig. 58); orifice prominent. Stipes as in Fig. 56.

THORAX. — Figs. 64-66. L_{th} 1.30 (1.07-1.56) mm, D_{th} 1.20 (0.97-1.45) mm. All thoracic sclerites covered with fine microtrichia. Antepronotum with medial commissure very strong, in dorsal view reaching to or nearly to rear margin of phragma I, reaching to or slightly surpassing anterior margin of scutal process (Fig. 78); antepronotal notch varying from obtuse, with medial corners broadly rounded and scarcely surpassing scutal process (Fig. 85), to fairly acute, with medial corners moderately right-angled and well surpassing scutal process (Fig 83; intermediate forms in Figs. 78, 84); anterior margin of antepronotum straight or slightly concave; lateral antepronotal setae restricted to near lateral edge; LAS/side 7 (4-9). Postpronotum fused with scutum antero-dorsally, but well delimited postero-dorsally, fused with anteanepisternum ventrally; postpronotum without setae, but with 2 small, indistinct sensilla (?) on antero-dorsal border (Fig. 64); postpronotal apophyseal pit appearing as a clear oval; postpronotal apophyses strong (Fig. 78). Scutum in side view flat or slightly concave posteriorly, moderately arched medially and anteriorly; scutal process well developed; dorsocentrals ranging from completely uniserial to irregularly biserial or staggered posteriorly (Figs. 79-82); a few tiny, clear dots (sensilla?) present in or just beside DCS row; DCS/side 13 (8-24), $MaxL_{dcs}$ 172 (146-220); acrostichals absent; prealars all in lightly sclerotized postero-dorsal region of prealar callus; PAS/side 7 (5-8); supraalars absent; scutal angle moderate (Fig. 78); parapsidal suture arched, with internal apodeme; humeral scar a roughened oval just anterior to dorsal 0.2 of parapsidal suture; faint, narrow medial scutal scar running from scutal process to near mid-point of scutum, there expanding to form broader, pale scar which narrows and fades near ends of DCS rows; microtrichia much longer in this expanded region; scutellar setae dispersed or roughly in 2 long (posterior) and 1 short (anterior) row; ScS 35 (23-60), $MaxL_{scs}$ 229 (186-341). Postnotum with medial cleft reaching to near moderately sharp postero-dorsal corner (Fig. 65, 73); postnotum with short medial suture postero-ventrally (Fig. 72). Anteanepisternal pit ill-defined ventrally; medioanepisternum II delimited completely, rounded ventrally; anapleural suture strong; ASR 0.59 (0.55-0.62); 1 or 2 fine setae on epimeral II protuberance; no other setae on any pleural sclerite.

WING. — L_w 3.6 (3.2-4.0) mm, W_w 1.09 (0.97-1.17) mm. Outline as in Fig. 93. Rear margin slightly concave just distal to anal lobe, anal lobe slightly acute. Dry wing showing: vestige of ?R_4 as weak concave fold running approximately parallel to R_{4+5} from about fR to wing tip; vestige of ?R_5 as convex fold running just anterior to M_{1+2} from about fR to wing margin; vestige of ?M_2 as convex fold just posterior to M_{1+2}; sharp concave fold running midway between M and Cu from arculus through apparent m-cu to merge with vestige of ?M_3, the latter running just anterior to M_{3+4} from apparent m-cu to wing margin; a weak concave fold running between M_{3+4} and Cu_1, bifurcating distally; strong concave vannal fold running from base of Cu nearly to wing margin; weak concave fold posterior to An. Slide mounted wing showing: microtrichia visible as numerous, close points at 150×, as short, seta-like projections arising from tiny points or dots at 650×. Membrane without setae. Marginal setal fringe more or less in double row along fore margin of costa, becoming alternating long-short past distal end of costa, longest on anal lobe. Costa becoming easily discernible just before humeral cross-vein, gradually increasing very slightly in width distally; costa ending slightly before tip of wing, about at level of end of M_{1+2}; costal projection (Fig. 145) 107 (98-119) or 5.9 (5.0-7.5) times its width; Sc appearing as sharp concave fold proximally, becoming very weak beyond forking of R, faintly reaching C. R_1 just slightly enlarged distally. R_{2+3} fairly strong proximally, fading gradually beyond about 0.2 of its length, running about mid-way between R_1 and R_{4+5}; R_{2+3} ending much closer to tip of R_1 than to tip of R_{4+5}; R_{4+5} strong, ending before level of end of M_{1+2}. r-m strong, just slightly and fairly uniformly arched; base of r-m distal to apparent m-cu by 1-2 times width of r-m. M a mere trachea proximally, gradually becoming stronger towards apparent m-cu; M_{1+2} fading rapidly just beyond r-m; vestige of ?R_5 just barely visible as slight discoloration just anterior to distal 0.3 of M_{1+2}; vestige of ?M_2 just barely visible as slight discoloration just posterior to distal 0.6 of M_{1+2}; apparent m-cu little more than a trachea, approximately perpendicular to Cu and M; apparent m-cu distal to apparent fCu by about 1-2 times width of apparent m-cu;

VR 0.93 (0.93-0.95); M_{3+4} weak. Cu strong, with prominent trachea visible to apparent m-cu; distal 0.2 of Cu_1 curving gently posteriorly; An weak, fading before wing margin. Remigium (Fig. 89) with 1 strong or 1 strong and 1 weak seta on hand, 1 weak seta and about 12 campaniform sensilla just beyond wrist, and 3 (2-4) setae and 4 large (Fig. 90: arrow heads) and about 8 smaller campaniform sensilla on distal 0.5 of forearm. Setae 17 (9-23) on R, 10 (6-12) on R_1, 6 (4-10) on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 3 ventrally on Sc just beyond arculus (Fig. 90), 2 dorsally on R_1, 1 dorsally and 1 ventrally near base of R_{2+3}, and 3 or 4 dorsally on R_{4+5}. Squama (n = 3) with 38-52 strong setae, $MaxL_{sqs}$ 168-198; alula bare.

LEGS. — Legs long, slender; $\bar{L}_{p_I}:\bar{L}_{tot}$ 1.08; Fe I with sparse postero-dorsal beard of about 10-15 long setae. Apical spur of Ti I long, slender, with fairly numerous prickles on basal 0.3-0.5; L_{tispI} 87 (76-95); apical spurs of Ti II stouter, subequal to equal in length, with numerous prickles on basal 0.5-0.7; L_{tispII} 59 (50-71); apical spurs of Ti III with numerous prickles on basal 0.5-0.6; $L_{atispIII}$ 64 (52-86), $L_{ptispIII}$ 97 (86-105); all apical tibial spurs apparently with basal oval sensory dome. Weak polygon pattern often visible near apex of Ti I; polygon pattern on Ti III faint to well developed (Fig. 109). Ti III with posterior comb of about 17-20 spines arranged in a fairly regular single row (Figs. 21, 109). Apical 0.5 of posterior surface of Ti III with numerous stout spine-like setae (Figs. 21, 22, 109); these setae fewer proximally, gradually increasing in number distally. Spiniform setae on first 3 tarsomeres of P I-III as follows: 5-8, 2 (apical), 0; 9-13, 3-7, 0; 10-18, 7-9, 0-2 (at about 0.6). Tm_4 cordiform, with slightly swollen, membranous, apical sole ventrally; articulation of Tm_5 distinctly proximal to apical margin of Tm_4, dorso-lateral region of Tm_4 distinctly constricted just before apex. Claws slightly expanded apically, with about 7-10 apical teeth (Figs. 23, 24); 3-5 slender spines arising from base of claws. Empodium long, curving up between claws, with numerous long, slender, curved spines (Fig. 23). Lengths and ratios of leg segments as follows:

	Fe	Ti	Tm_1	Tm_{2-5}	LR	BV	SV
P_I	1570 (1360–1690)	1780 (1460–1930)	1140 (940–1260)	1240 (1080–1340)	0.64 (0.63–0.65)	3.75 (3.50–4.30)	2.94 (2.87–3.00)
P_{II}	1710 (1480–1890)	1590 (1340–1720)	760 (620–820)	970 (860–1040)	0.48 (0.46–0.51)	4.17 (4.02–4.27)	4.36 (4.07–4.54)
P_{III}	1970 (1760–2130)	1940 (1790–2100)	1190 (960–1330)	1290 (1160–1390)	0.61 (0.59–0.65)	3.94 (3.75–4.13)	3.30 (3.06–3.54)

HYPOPYGIUM. — Fig. 130. Tg IX with 17 (10-23) setae/side. Anal point strong, fairly slender apically, broadening slightly basally, with short apical peg set in small depression; strong apodemes on underside of Tg IX nearly parallel for about half length of Tg IX, then diverging and running along fore margin of Tg IX; L_{gncx} 410 (370-445); $\bar{L}_{tot}:\bar{L}_{gncx}$ 12. Basal plate very well developed, with numerous strong microtrichia ventrally. Medial field well developed, with dorsal border a fairly sharp ridge just slightly free from gonocoxite; medial field with numerous microtrichia, with setae particularly strong ventrally; distal 0.2-0.3 of medial field slender, free; medial field with 2-6 setae in proximo-dorsal corner. Basimedial setal cluster with numerous very long, strong setae radiating fan-like, setae reaching well beyond midline of hypopygium (cluster not shown in Fig. 130a). Gonostylus as in Figs. 130a-130e, with subterminal peg and short terminal ridge; shape of gonostylus quite variable, depending on orientation. Sternapodeme broad medially, with strong anterolateral projections; fore margin strongly concave medially. Basal wedge very strong, rugose, extending nearly to distal end of basal plate.

DIAGNOSIS. — Antenna plumose, eyes hairy, basimedial setal cluster strong; the gonostylus is unlike any other species. *D. nivoriunda* is the most similar species but has a triangular gonostylus.

MATERIAL EXAMINED. — *Minnesota,* Hennepin County, Basspond, 7 Mar. 1940, D. G. Denning, R. H. Daggy, P. H. Hardin, 1 male (UMn); Houston County, Beaver Creek Valley State Park, N. J. mosquito trap, 27 April, 20 Oct. 1970, leg. E. F. Cook, 5 males (UMn); 1 mi. N of Stillwater, on snow by Brown's Creek, 4 March 1969, leg. D. Hansen, air temp. about 35°F., 4 males (UMn); Washington County, 2 mi. W, 1 mi. S of Lakeland, N. J. mosquito trap near Valley Creek, leg. E. F. Cook, 15, 23 Oct. 1971, numerous males (UMn); as above, but on snow by small creek near Valley Creek, leg. D. Hansen, 14 Feb. 1967, 29 males (UMn); as above, but on snow by Valley Creek, 31 Jan. 1967, leg. D. Hansen, 4 males; *Wisconsin,* Burnett County, 45°43'N, 92°09'W, 11 mi. E, 4 mi. S of Siren, light trap or on snow by stream, Sept. to May, 1966-1971, leg. D. Hansen, about 250 males (UMn); Columbia County, T 11 N, R 8 E, W-1/2 S7, Prentice Cr., 4-III-67, leg. R. Narf, 2 males, 3 females (JES); Crawford Co., T 10 N, R 4 W, Sec. 6, Tainter Cr., 26-I-1970, leg. R. Narf, 1 male (UMn); Iowa Co., T 6 N, R 2 E, Sec. 5, Otter Creek, 29-I-1970, leg. R. Narf, 5 males (UMn); Sauk County, Otter Creek, 15-II, 22-II, 8-III, 15-IV-1969, leg. R. Narf, 9 males (UMn); Sauk County, T 11 N, R 7 E, Sec. 22-23, Parfrey's Glen, 19-XI-1966, 13-III-1969, leg. R. Narf, 7 males (UMn); Sauk County, T 11 N, R 6 E, S 32-33, Otter Creek, 27-III-1967, leg. R. Narf, 1 male (JES); Sauk County, Parfrey's Glen, 4-III-1967, leg. R. P. Narf, 13 males (JES); Waushara County, W. Br. White River, T 13 N, R 10 E, S 10, 9-II-67, leg. R. Narf, 7 males (JES); Waushara County, Mecan R., T 18 N, R 9 E, S 16, 9-II-67, leg. R. Narf, 4 males (JES); as above, but at Hy. 21 bridge, 9-II, 1-III-1967, 11 males (JES).

DISCUSSION. — *D. mendotae* was described from larvae, pupae, and adults from streams feeding Lake Mendota at Madison, Wisconsin. The hypopygial figure drawn by Muttkowski shows a very well developed basimedial setal cluster and long anal point. The shape of the gonostylus is also reasonably clear and I feel fairly certain that the species I am calling *mendotae* is actually that described by Muttkowski.

D. mendotae is the species commonly encountered when collecting in Minnesota and Wisconsin, and I have long series of specimens. One can find a large variation in several characters when specimens from different localities and different emergence dates are examined. The number of dorsocentral setae, for example, varies considerably both in number (i.e., by a factor of 3, or from 8 to 24) and arrangement (Figs. 79-82). The shape of the gonostylus also varies quite a bit, although the gonostylus is quite irregularly shaped and appears quite different from different angles. It is possible that what I have called *mendotae* may be two or more species; the gonostyli in Figs. 130b and 130e are certainly different from those in 130d. Until I can rear more specimens, however, I would not consider splitting my material into any new species.

Larvae of *mendotae* from rocks, gravel, and vegetation are collected in running water of streams. The species emerges from September to May and is easily collected walking about on the snow by streams or resting on the branches of nearby alders or other shrubs. On warmer nights in the fall and spring it readily comes to light traps.

LOCATION OF TYPES. — Muttkowski (1915: 121) states that the holotype male, allotype female, and larvae, pupae, and exuviae were deposited in the Milwaukee Public Museum. I contacted Mr. James Lawton of that Museum, and he kindly searched the Museum's collection for the types of *mendotae* for me. He was unable to find any of Muttkowski's material, however, nor has it turned up at any other collection. It may be that it's still extant, but I do not know of its whereabouts.

Diamesa nivicavernicola [8] new species

Description (unless otherwise stated, n = 5 and measurements are in microns):

TOTAL LENGTH. — 4.3 (3.3-5.1) mm (n = 9).

COLORATION (pinned specimen). — flagellum light gray, with Flm_1 becoming dirty orange proximally; pedicel dirty orange; vertex dark gray, pruinose; thorax slightly orangish gray, pruinose; scutal stripes not evident; femora dirty orange proximally, becoming brown distally; tibia and tarsi light brown; abdomen dark gray-brown; haltere shaft and capitellum slightly yellowish white, base becoming light brown; hypopygium brown.

ANTENNA. — Fig. 40. 10 or 11 flagellomeres, with partial or complete fusion often occurring between 2 or 3 of $Flm_{6\text{-ultimate}}$; non-plumose, longest flagellar seta (on Flm_{ultimate}) 0.16 (0.14-0.17)L_{fl}; basal 0.3 of Flm_1 tapering proximally, rest roughly cylindrical, often slightly constricted at about mid-region or slightly swollen distally, without distinct basal nipple; $Flm_{2\text{-penultimate}}$ slightly fusiform, Flm_{ultimate} cylindrical in basal 0.6-0.7, tapering distally to blunt apex; flagellar setae short (MaxL 66-85), setae 1-5 on Flm_1, 3-4 on $Flm_{2\,\&\,3}$, 1-2 on Flm_4, 2-5 on Flm_5, 0 or occasionally 1 on $Flm_{6\text{-penultimate}}$, 4-6 on Flm_{ultimate}; setae basically in single irregular whorl/flagellomere; setal whorl at 0.5-0.8 of Flm_1, near 0.5 of $Flm_{2\text{-penultimate}}$, at 0.1 of Flm_{ultimate}; antennal furrow absent; all Flm's with long microtrichia. Antennal sensilla as follows (n = 3): large, blunt sensillum basiconicum 1 on $Flm_{1\text{-}5}$ (that on Flm_1 distinctly smaller than succeeding ones), occasionally 1 on

[8] From *nivis* (L.), snow; *caverna* (L.), cave, grotto; and *cola* (L.), dweller, inhabitant (Brown, 1954). See "Discussion."

Flm_7; smaller, blunt sensilla basiconica (Fig. 4) 1-2 on Flm_1, 2-4 on Flm_2, 3-4 on Flm_3, 5-6 on Flm_4, 4-5 on Flm_5, 2-4 on Flm_6, 2-6 on Flm_7, 3-5 on Flm_8, 2-4 on Flm_9, 3-5 on Flm_{10}, 0-2 on Flm_{11}; long, pointed sensilla basiconica (Figs. 1-3) 0-1 on Flm_7, 2 on $Flm_{8\ \&\ 9}$, 1-2 on Flm_{10}, numerous on Flm_{11}; ringed sensilla coeloconica 1 dorsal, 1 ventral on Flm_1, 1 dorsal on Flm_2, 4-5 on Flm_{11}; small sensilla coeloconica 2 on Flm_1, 1 on $Flm_{2\ \&\ 3}$, 3-5 near apex of Flm_{11}. $\overline{L}_{flm_{1-5}} : \overline{W}_{flm_{1-5}}$ 85:35, 44:32, 43:30, 34:27, 24:28, $\overline{L}_{flm_{ultimate}} : \overline{W}_{flm_{ultimate}}$ 134:34 ($Flm_{7\text{-penultimate}}$ slightly more fusiform and smaller than $Flm_{3\text{-}6}$, but so often partially fused that L and W not measurable); AR 0.34 (0.28-0.39) (n = 4); 1 preapical antennal seta; L_{pas} 46 (41-49); pedicel roughly globose, with microtrichia; D_{pd} 82 (71-88); 2 (occasionally 1 or 3) pedicellar setae ventro-medially; 1 campaniform sensillum dorsally at ridge of indentation for Flm_1 (as in Fig. 41); scape quite small, with articulation to pedicel ventro-medially and to antennifer ventro-laterally; H_{sc} 72 (61-85); scape apparently with microtrichia, but without setae; dorsal region of scape weaker, less well sclerotized (Fig. 52).

HEAD. — Fig. 52. W_h 531 (454-584); coronal suture strong, ending between tops of antennal sockets and lower ends of vertex projections over scapes, bifurcating on dorsal region of vertex, with strong coronal apodeme; coronal triangle short; vertex not sunken at arms of coronal suture; coronal triangle with usual 4 short setae in large, clear sockets; rear margin of coronal triangle produced dorsad at midline to form small, clear, triangular nape; vertex medially produced toward and broadly fusing with frons, although much more weakly sclerotized between antennal sockets; vertex fairly strongly projecting over dorso-medial region of each scape; reduced ocelli very far apart, above projections over scapes; dorsal ocular apodeme absent or very weak, short; interantennal bar absent; frons weakly or not at all delimited from antennal sockets; epistomal suture moderate to weak, usually complete; interocular setae usually distinguishable from inner verticals, at about 0.4-0.6 of distance from dorso-medial margin of eye to midline of vertex; IOS/side usually 1, occasionally 0 or 3; postocular setae in uniserial or slightly staggered row running just mesad to posterior margin of eye from near postero-ventral eye margin to merge with about 4-6 slightly longer, stronger outer vertical setae; PtOS/side 4-9; inner vertical setae not well differentiated from outer verticals, the more dorsal and medial ones being more curved and slightly decumbent, reaching nearly to arms of coronal suture dorsally or to 0.71 (0.63-0.75) of distance from dorso-medial margin of eye to midline of vertex; inner verticals dispersed on dorsal region of vertex and just dorsomesad of dorso-medial margin of eye, group occurring well below dorsal margin of eye anteriorly; medial vertex setae absent; no vertex hump behind eyes. Clypeus just slightly wider than long; clypeal setae in two lateral groups; CS 8 (5-9). Tentorium (Fig. 61) not swollen antero-laterally at base, but with distinct postero-medial basal plate-like projection; tentorium usually extending slightly beyond PTP. Eyes nearly reniform; eye strongly hairy, microtrichia about twice the height of ommatidial lens; eyes with dorso-medial margin broadly truncate, dorsal corner broadly rounded; dorso-medial margin not extending as far mesad as ventro-medial margin; H_e 268 (222-293); ventral ocular apodeme absent (Fig. 61); antero-ventral margin of eye contacting tentorium; antennifer fairly well developed. Palpus 5-segmented; PS_1 without setae, subglobose, about as well sclerotized as other palpal segments; $PS_{2\text{-}5}$ setous, basically cylindrical, PS_3 slightly swollen medially; $\overline{L}_{ps_{2-5}} : \overline{W}_{ps_{2-5}} : \overline{MaxL}_{pss_{2-5}}$

82:42:62, 139:46:56, 117:37:40, 232:33:25; sunken organ hemispherical, prominent, at 0.8 of PS_3; D_{so} 22 (18-26); all palpal segments with grouped microtrichia; CP 0.93 (0.88-1.00); palpal stoutness 3.61 (3.22-3.96). Cibarial pump higher than wide, with long, slender, pointed cornua; orifice fairly prominent. Stipes and lacinia similar to *D. mendotae*, Fig. 56.

THORAX. — L_{th} 1.22 (0.99-1.38) mm, D_{th} 1.13 (0.88-1.31) mm. All thoracic sclerites covered with fine microtrichia. Antepronotum with short, weak medial commissure which extends only about 0.4 of distance to rear margin of phragma I and is well surpassed by scutum; antepronotal notch very broad, gaping, obtuse; medial corners very broadly rounded, scarcely or not surpassing anterior margin of scutum; anterior margin of antepronotal halves arched, becoming concave antero-laterally; lateral antepronotal setae somewhat dispersed medially, region of lateral setae swollen; LAS/side 14 (9-20). Postpronotum fused completely with scutum antero-dorsally and with anteanepisternum II ventrally, delimited from scutum postero-dorsally; postpronotum without setae, but with 2 or 3 faint to clear post-pronotal sensilla(?) antero-dorsally; postpronotal apophyseal pit a small, clear oval, but postpronotal apopnyses absent. Scutum in side view somewhat flattened, gently indented approximately above parapsidal suture, extending anteriorly beyond fore margin of antepronotum; scutal process absent. Dorsocentral setae ranging from completely uniserial to biserial at anterior and posterior ends of row; a few tiny, clear dots (sensilla?) present in or just beside DCS row; DCS/side 13 (9-17), $MaxL_{dcs}$ 147 (117-164); acrostichals absent. Prealar setae in staggered to fairly straight row on postero-dorsal region of prealar callus; PAS/side 6 (4-8); supraalar setae absent; scutal angle weak; parapsidal suture slightly arched, with internal apodeme; humeral scar a tuberose irregular area extending antero-dorsad from dorsal 0.3 of parapsidal suture; medial scutal scar running as a faint, narrow line from the anterior-most point of scutum to about midpoint of scutum, there expanding to form a broader, pale scar which narrows and disappears at about the ends of the dorso-central setae rows. Scutellar setae sometimes in part in two rows, otherwise simply scattered; ScS 27 (23-32); $MaxL_{scs}$ 179 (139-209). Medial cleft of postnotum reaching about 0.5 length of postnotum; postnotum with suture on midline posteriorly and with broadly rounded postero-dorsal margin (as in Fig. 76). Anteane-pisternal pit a very well-defined oval; medioanepisternum II delimited completely, ventral margin rounded; anapleural suture strong; ASR 0.52 (0.45-0.56); 0 or 1 seta on epimeral II protuberance, which is only moderately developed; no other setae on any other pleural sclerite.

WING. — L_w 3.2 (2.7-3.7) mm, W_w 1.11 (0.88-1.27) mm. Outline as in Fig. 98. Wing margin usually slightly concave at ends of R_1, M_{3+4}, and Cu_1, slightly convex just distal to anal lobe, anal lobe slightly obtuse. Dry wing showing folds about as in *D. mendotae*. Slide mounted wing showing: microtrichia visible as very numerous, close points at 150×, just barely discernible at 650× as very short seta-like projections arising from minute points or dots. Membrane without setae. Marginal setal fringe as in *D. mendotae*. Costa becoming easily discernible just before humeral cross vein, gradually increasing slightly in width distally, widest along distal 0.5 of R_1; costa ending slightly before tip of wing, about at level of end of M_{1+2}; costal projection 73 (67-79) or 2.7 (2.5-3.1) times its width; Sc appearing as sharp fold proximally, becoming very weak beyond forking of R, ending well be-fore C. Distal 0.4-0.5 of R_1 somewhat enlarged and appressed to C, somewhat diffusely fusing with C. R_{2+3} strong proximally, fading rather abruptly at about 0.4 of R_1, scarcely visible even under phase contrast beyond this; R_{2+3} running slightly closer to R_{4+5} than to R_1; very faint distal region of R_{2+3} ending quite close to tip of R_1; R_{4+5} strong, ending before level of end of M_{1+2}. r-m strong, moderately arched (more so proximally); base of r-m distal to apparent m-cu by 0.5-1 times width of r-m. M a mere trachea proximally, gradually becoming stronger towards m-cu; M_{1+2} strong proximally for just a very short distance, then fading abruptly; vestiges of ?R_5 and ?M_2 about as in *D. mendotae;* apparent m-cu little more than a trachea, approximately perpendicular to Cu and M; apparent m-cu about at apparent fCu or distal to it by less than width of apparent m-cu; VR 0.93 (0.82-0.98); M_{3+4} strong proximally for a short distance, then fading abruptly; Cu strong, with prominent trachea visible to apparent m-cu; Cu_1 just slightly and fairly uniformly arching posteriorly, or distal 0.3 curving very gently posteriorly; An quite weak, fading before wing margin. Remigium with 1 strong seta on hand, 1 or 2 weak setae and about 7-11 campaniform sensilla just beyond wrist, and 0(?)-4 setae and about 3 large and 6-8 smaller campaniform sensilla on distal 0.5 of forearm. Setae 19 (16-21) on R, 11 (8-15) on R_1, and 14-16 on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 1-2 ventrally on Sc just beyond arculus, 1 dorsally on R_1, 1 dorsally and 1 ventrally near base of R_{2+3}, and 0 on R_{4+5}. Squama with 27 (19-34) setae, $MaxL_{sqs}$ 117 (95-129); alula with 6 (4-9) short setae.

LEGS. — Legs very long, quite slender; $\overline{L}_{p_1}:\overline{L}_{tot}$ 1.71. Fe I without beard, longest seta on any femur less than width of that segment. Apical spur of Ti I fairly long, slender, with fairly numerous prickles on basal 0.5; L_{tispI} 52 (48-60); apical spurs of Ti II slightly stouter, subequal in length, with fairly numerous prickles on basal 0.5-0.6; L_{tispII} 43-71; apical spurs of Ti III with fairly numerous prickles on basal 0.5; $L_{atispIII}$ 63 (50-71), $L_{ptispIII}$ 89 (69-100); all apical tibial spurs apparently with basal oval mark (sensory dome or pit?) on basal 0.2-0.4. Weak polygon pattern not visible near apex of Ti I; polygon pattern on Ti III well developed. Ti III with posterior comb of about 18-25 spines arranged in a fairly regular single row. Apical 0.2 of posterior surface of Ti III with more numerous, slightly stronger than usual setae, but without stout spine-like setae as in species with plumose male antennae. Spiniform setae on first 3 tarsomeres of P I-III as follows: 2 (apical), 2 (apical), 2 (apical); 11-20, 4-6, 2 (apical)-3; 17-26, 7-12, 3-7. Tm_4 cordiform, about as in *D. mendotae.* Claws with about 5-7 apical teeth and with 1 strong preapical tooth along outer margin (Fig. 25); 3-5 long, slender spines arising from

	Fe	Ti	Tm_1	Tm_{2-5}	LR	BV	SV
P_I	2120 (1650–2500)	2230 (1710–2600)	1450 (1110–1710)	1380 (1110–1650)	0.65 (0.63–0.67)	4.19 (4.03–4.34)	3.00 (2.89–3.08)
P_{II}	2260 (1720–2670)	2040 (1600–2400)	1110 (860–1310)	1160 (920–1340)	0.54–0.55	4.67 (4.52–4.79)	3.88 (3.87–3.93)
P_{III}	2240 (1760–2640)	2330 (1790–2690)	1590 (1230–1860)	1550 (1240–1760)	0.68 (0.67–0.69)	3.97 (3.84–4.07)	2.88 (2.84–2.91)

base of claws. Empodium long, curving up between claws, with numerous long, slender curved spines; minute spinous pulvilli apparently present near base of claws. Lengths and ratios of leg segments, p. 126.

HYPOPYGIUM. — Fig. 136. Tg IX with 0-4 setae/side. Anal point slender distally, becoming very broad basally, with about 4-8 setae/side on broad basal region and with small apical peg; apodemes on underside of Tg IX forming very obtuse V, ending in antero-lateral corners of Tg IX; L_{gncx} 277 (239-300), $\bar{L}_{tot}:\bar{L}_{gncx}$ 16. Gonocoxite broad. Basal plate fairly well developed, with very coarse microtrichia ventrally, and with disto-medial margin slightly obtuse. Medial field weakly developed. Gonocoxite with very strong dorso-medial corner or ridge. Gonostylus expanded distally, with flat, microtrichia-covered area dorso-distally; gonostylus apparently without subterminal peg; gonostylus not capable of folding forward. Sternapodeme produced to a point antero-medially. Basal wedge short, slender, but well sclerotized.

DIAGNOSIS. — Antenna with 10-11 flagellomeres, gonostylus not folding forward and with flat, distal, microtrichia-covered region. There are no other known species with these features.

MATERIAL EXAMINED. — [*Alaska*], Valdez Alsk, 5 mi NW 24 VIII, 48 BLMorris, Alaska Ins project, 1 male (USNM); *Washington*, 3 mi E, 6 mi S of Glacier, in cavern in snow field above timberline on Mt. Baker, 7, 8 Sept. 1967, leg. D. Hansen. about 100 males and females (UMn).

DISCUSSION. — I was once collecting in a small melt-water stream above timber-line on Mt. Baker, and I followed the stream to where it emerged from a small cavern it had cut in a snowfield. The snowfield was about two meters deep, and the cavern cut in it was about one to two meters wide and one meter high and extended back into the snowfield for many meters. Out of curiosity I looked into the cavern and was amazed to see that there were scores of adult *D. nivicavernicola* and, interestingly, also many mycetophilids walking on the roof of the cavern. The presence of numerous mycetophilids implies to me that the cavern was probably a sort of natural Malaise trap, and that both the *Diamesa* and the mycetophilids came into it to find shelter or a hiding place. The name *nivicavernicola* indicates this unusual collecting site, i.e., it means "snow cave dweller."

D. nivicavernicola has a number of noteworthy morphological features. It is the only reported species with 10 or 11 flagellomeres in the antenna, and it is the only species I know of with setae on the alula. The legs, furthermore, are extraordinarily long, that is, the fore leg is some 1.71 times the body length (the value in species with plumose antennae is generally 1.0-1.1). The gonostylus is unusual because it extends rearward and does not fold anteriorly as is the usual case in orthoclads. The gonostylus also lacks a subterminal peg.

LOCATION OF TYPE. — The holotype is a specimen collected by me on Mt. Baker (see "material examined"); it is deposited in the entomology collection of the Department of Entomology, University of Minnesota, St. Paul, Minnesota. All other specimens examined are designated as paratypes and are deposited in the UMn, USNM, CNC, and ANSP.

Diamesa nivoriunda (Fitch)

Chironomus nivoriundus Fitch, 1847: 282-283 (described from male and female adults from New York).

D. nivoriunda (Fitch). Johannsen, 1903: 439-441, pl. 47, 48 (as synonym of "*D. waltlii* Meig. (= *aberrata* Lundb.)"; description of adult, pupa, and larva); Johannsen, 1934: 348 (discussion of correct generic placement of "*nivoriundus*" Fitch); Johannsen, 1937: 34-35 (further description of larva and pupa); Johannsen, 1952: 13 (as senior synonym of *Eutanypus borealis* Coq. and *Tanypus heteropus* Coq.); Paine and Gaufin, 1956: 295 (some ecological requirements of larva); Roback, 1957b: 51-53 (larva and pupa in key; records from Pennsylvania); Curry, 1965: 137 (some ecological requirements of larva, from Paine and Gaufin (1956)).

[*non*] *D. nivoriunda* (Fitch). Sublette, 1964: 130, 132 (misdetermination of a western species with hairy eyes); Cole, 1969: 99 (probable misdetermination of an Oregon species).

Description (unless otherwise stated, n = 5 and measurements are in microns): as in *D. mendotae* except:

TOTAL LENGTH. — 5.3 (4.9-5.7) mm.

COLORATION (pinned specimens). — about as in *D. mendotae*.

ANTENNA. — longest flagellar setae 0.68 (0.67-0.70)L_{fl}; Flm_{13} with apical 0.20-0.23 spindle-shaped, mainly swollen ventrally; 2 short, slender setae dorso- and ventro-medially on Flm_1; long (MaxL 883-924) setae 1 on Flm_1, 4 on Flm_2, about 8-11 on Flm_3, increasing to about 14-15 on Flm_{12}, numerous on Flm_{13}; setae usually on basal 0.1-0.3 of spindle-shaped region of Flm_{13}; $\overline{L}_{flm_{1-13}}:\overline{W}_{flm_{1-13}}$ 97:61, 21:54, 24:52, 27:48, 25:47, 25:46, 25:47, 28:46, 32:45, 34:44, 35:43, 37:41, 848:40; AR 1.78 (1.72-1.81); 1 preapical antennal seta, L_{pas} 43 (38-46); D_{pd} 186 (184-188); 1(?)-3 (usually 2) pedicellar setae ventro-medially; H_{sc} 203 (192-208).

HEAD. — W_h 733 (712-753); dorsal ocular apodeme weak to moderate; epistomal suture fairly weak medially, weak or nearly absent laterally; IOS/side 3-5, rarely not well separated from inner verticals; inner verticals reaching to 0.43-0.67 of distance from dorso-medial margin of eye to midline of vertex. Clypeus usually slightly wider than long; CS 14 (11-19). Dorso-medial margin of eye extending not quite as far or as far mesad as ventromedial margin; H_e 330 (327-335); $\overline{L}_{ps_{2-5}}:\overline{W}_{ps_{2-5}}:\overline{MaxL}_{pss_{2-5}}$ 105:48:113, 166:57:91, 159:44:60, 243:35:34; D_{so} 21 (16-26); CP 1.08 (1.01-1.14); palpal stoutness 3.70 (3.41-3.85).

THORAX. — L_{th} 1.48 (1.30-1.60), D_{th} 1.34 (1.21-1.46) mm. Antepronotum with medial commissure strong, not quite reaching rear margin of phragma I, reaching to or slightly surpassing anterior margin of scutal process; antepronotal notch acute, medial corners fairly sharp, well surpassing scutal process; LAS/side 9-11; postpronotal apophyses rather weak; dorsocentrals uniserial to slightly staggered posteriorly; DCS/side 8 (6-11), $MaxL_{dcs}$ 196 (172-208); PAS/side 8-10; ScS about 30. $MaxL_{scs}$ 198-222; ASR 0.65 (0.63-0.70); 0-1 seta on epimeral II protuberance.

WING. — L_w 3.7 (3.6-3.8) mm, W_w 1.19 (1.12-1.26) mm. Costal projection 104 (85-134) or 5.0 (4.4-5.5) times its width; apparent m-cu distal to apparent fCu by about 1-4 times width of apparent m-cu. VR 0.94 (0.93-0.95). Remigium (n = 3) with 1 strong seta on hand, 1-2 weak setae and about 9 campaniform sensilla just beyond wrist, and 1-3 setae and 4 large and about 9 smaller campaniform sensilla on distal 0.5 of forearm. Setae 16-17 on R, 8-10 on R_1, and 6 (3-8) on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 3 ventrally on Sc just beyond arculus, 2 dorsally on R_1, 1 (occasionally 2) dorsally and 1 ventrally near base of R_{2+3}, and 2-4 dorsally on R_{4+5}. Squama (n = 2) with 34-43 strong setae, $MaxL_{sqs}$ 156-173.

LEGS. — $\bar{L}_{p_I}:\bar{L}_{tot}$ 1.07; Fe I with sparse postero-dorsal beard of about 8-12 long setae. Apical spur of Ti I long, slender, with rather sparse prickles on basal 0.2-0.3; apical spurs otherwise essentially as in *D. mendotae*. Weak polygon pattern occasionally visible near apex of Ti I. Ti III with posterior comb of about 18-23 spines arranged in a fairly regular to slightly staggered single row. Spiniform setae on first 3 tarsomeres of P I-III as follows: 7-11, 2 (apical)-4, 0; 10-13, 5-7, 0-2 (1 at 0.5 or 1 apical and 1 at 0.5); 15-18, 6-8, 1-3. Lengths and ratios of leg segments as follows:

	Fe	Ti	Tm_1	Tm_{2-5}	LR	BV	SV
P_I	1550 (1410–1630)	1770 (1560–1860)	1170 (1040–1260)	1200 (1130–1240)	0.66 (0.64–0.68)	3.73 (3.57–3.81)	2.84 (2.69–3.00)
P_{II}	1680 (1550–1760)	1610 (1450–1690)	700 (640–740)	880 (840–910)	0.44 (0.42–0.44)	4.52 (4.32–4.70)	4.68 (4.47–4.89)
P_{III}	1870 (1760–1960)	1940 (1760–2030)	1220 (1140–1310)	1270 (1230–1340)	0.63 (0.58–0.66)	3.98 (3.80–4.17)	3.13 (2.94–3.34)

HYPOPYGIUM (without reference to *D. mendotae*). — Fig. 129. Tg IX with 13 (8-19) setae/side. Anal point strong, broadening just slightly basally, often with slight distal keel, apparently without or with only small apical peg; strong apodemes on underside of Tg IX diverging, arching to antero-lateral corners of Tg IX; L_{gncx} 360 (332-374); $\bar{L}_{tot}:\bar{L}_{gncx}$ 15. Basal plate very well developed, with numerous strong microtrichia and a few setae ventrally, with disto-medial corner rounded, projecting. Medial field about as in *D. mendotae*. Basimedial setal cluster with numerous very long, strong setae radiating slightly, setae reaching base of opposite cluster. Gonostylus approximately triangular, with subterminal peg and short terminal ridge. Sternapodeme fairly narrow medially, with antero-lateral projections; anterior margin straight to moderately concave medially. Basal wedge very strong, rugose, extending nearly to distal end of basal plate.

Diagnosis. — Antenna plumose, eyes hairy, basal plate produced disto-medially, basimedial setal cluster strong, gonostylus triangular. The gonostylus is distinctively shaped.

Material examined. — [*Alabama*, presumably], Ala., Florence, 20-26 XII 1954, W. E. Snow, 55-7337-6, 1 male (USNM); *Indiana*, Warren Co., 2 mi. SE Greenhill, Small Pine Creek, leg. G. R. Finni, 18-I-1969, 1 male, 1 female (IllNatHstSur); *Massachusetts*, Amherst, 29-IV-39, M. E. Smith, 1 male (JES); *Maryland*, Forest Glen, Montgomery County, 19 April 1968, leg. W. W. Wirth, light trap, 2 males (USNM); Hagerstown, IV.17.18, 1 male (USNM); *Michigan*, East Lansing, 22 Mar. 1936, C. Sabrosky, slide 41.IV.5a, 1 male (USNM); Hunt Creek, Montmorency County, XII-22-1942, J. W. Leonard, 2 males (USNM); Montmorency Co., along Hunt Creek, Sec. C, on snow, 22 Dec. 1942, L. H. Bush, L42-176, 3 males (UMich); *Minnesota*, Cook Co., Forest Service Station at Hovland, N. J. mosquito trap, 21 April, 19, 30 Sept., 13-19 Oct. 1968, 28 Sept., 14 Oct. 1969, 19 males, 9 females (UMn); Cook Co., 2 mi. N of Hovland on US 61, N. J. mosquito trap, 30 April 1970, leg. E. F. Cook, 1 male (UMn); Duluth, on snow by Amity Creek, air about 34°F, cloudy, 27 March 1971, leg. D. Hansen, 5 males (UMn); Duluth, outlet to Heartly Pond, 23 Feb. 1971, about 10 males, 10 females, 20 pupal exuviae (UMn); Duluth, on snow by Lester River, 1 Jan., 15, 16, 25 Feb. 1971, leg. D. Hansen, numerous males, females, pupal exuviae (UMn); Olmsted County, 2/22, C. N. Ainslie, 6 males (UMn); 4 mi. S. of Cannon Falls, on snow by small stream, about 2 PM, 7 Feb. 1970, leg. D. Hansen, numerous males, females, pupal exuviae (UMn); *Missouri*, in stream 1.5 miles S. of Cabool, water 16°C, 12 Apr. 1969, leg. D. Hansen, 1 male pupa, numerous larvae (UNm); *Newfoundland*, Torbay, R. F. Morris, 14-IV-1966, 1 male (IllNatHstSur); *New York*, Ithaca, no dates (3 males) or various dates, Dec. to May, leg. O. A. Johannson, R. G. Beard, or H. K. Townes, about 14 males (Cornell, Townes); Ithaca, 100 yds. S. of Water St., Six-Mile, 21, 28.I.1968, E. L. Rittershausen, collector, 6 males (Cornell); Ithaca, 11 May '02, gynandromorph (female flagellum with 8 flagellomeres, normal male hypopygium) (Cornell); Ithaca, Buttermilk, 29-XII-1966, R. G. Beard, mating pair, 1 male (Cornell); Ludlowville, 24 Dec. 1965, leg. L. L. Pechuman, 1 male (Cornell); Myers, Salmon Creek Bridge, Dec. 1966, Jan. 1967, leg. L. L. Pechuman, 18 males (Cornell); *Ontario*, Ancaster, 1 Jan. 1967, J E H Martin, 5 males (CNC); Loon Lake nr. Essonville, 15-III-1965, Martin and McAlpine, 1 male (CNC); *Quebec*, Gatineau Park, 22 March 1964, leg. D. R. Oliver, No. Q 15-3, 1 male (CNC); *Virginia*, Falls Church, Holmes Run, 23 IV 1962, leg W W Wirth, light trap, 2 males (USNM); *Wisconsin*, Univ. Wis. Arboretum, III-21-1953, coll. F. E. Strong, 1 male (UCalDav); 45°43'N, 92°09'W, 11 mi E, 4 mi S of Siren, Burnett County, light trap by small, cold stream (Spring Brook), 8 Oct., 2 Nov. 1966, leg. D. Hansen, 2 males (UMn); Sauk Co., Otter Cr., 18-I, 8, 15-II-1969, coll. Richard Narf, 5 males (UMn).

Discussion. — Fitch (1847) proposed the name *Chironomus nivoriundus* ("the snow-born midge") for a common winter midge he found in New York State. The description could apply either to a *Diamesa* or a few other orthoclads; indeed, judging from Fitch's discussion of the species, Fitch possibly was seeing two or more species and calling them all *C.*

nivoriundus. He made no mention of the shape of the fourth tarsomere or of the presence or absence of the apparent m-cu cross-vein, so the description really doesn't permit even a definite generic placement. Johannsen (1903) reared a species which he called *D. Waltlii,* and he regarded *C. nivoriundus* Fitch as a synonym of *D. Waltlii.* Johannsen quite clearly illustrated the hypopygium of "*Waltlii.*" Johannsen (1934) later stated that *Waltlii* was not the same as *nivoriunda* (Fitch), and he further stated that *nivoriunda* belonged in *Diamesa* and not *Orthocladius,* where he (Johannsen, 1905) had once placed it.

Sublette (1964) and Cole (1969) were probably seeing *heteropus,* the common western hairy-eyed Diamesa.

D. nivoriunda is the most common northeastern species of *Diamesa.* It is sometimes taken with *cheimatophila* in the Northeast and with *mendotae* in the Midwest. The emergence period is from September to May.

LOCATION OF TYPES. — I have not tried to locate Fitch's material, although it is possibly at the New York State Museum in Albany.

Diamesa simplex Kieffer

D. simplex Kieffer, 1926: 80, 81 (described from 1 male taken on the Second Fram-Expedition to North America, "Havnen, 3.9.99, Schei."; figures part of gonocoxite, gonostylus); Oliver, 1959: 63 (features of hypopygium of holotype; as probable synonym to *D. aberrata* Lundbeck); Oliver, 1962: 4 (in discussion under *D. aberrata* Lundbeck; regards as distinct species; discussion of differences between *simplex* and *aberrata*).

D. aberrata Lundbeck. Edwards, 1935: 471 (in part) (misdetermination of 2 of 4 specimens); Andersen, 1937: 80-82 (misdetermination; description of larva, pupa, adult; figures of various parts).

Description (unless otherwise stated, n = 5 and measurements are in microns): as in *D. mendotae* except:

TOTAL LENGTH. — 4.3 (3.9-4.8) mm (n = 4).

COLORATION. — not noted before slide mounting.

ANTENNA. — longest flagellar setae 0.53 (0.50-0.58)L_{fl}; Flm_{13} with apical 0.20-0.25 spindle-shaped, mainly swollen ventrally; 1-2 short, slender setae dorso- and ventro-medially on Flm_1; long (MaxL 560-830) flagellar setae 0-1 on Flm_1, 2-4 on Flm_2, 7-9 on Flm_3, increasing to about 14 on Flm_{12}, numerous on Flm_{13}; $L_{flm\,1-13}$: $\overline{W_{flm\,1-13}}$ 91:50, 20:46, 23:46, 27:41, 29:40, 30:40, 34:40, 36:40, 39:41, 41:40, 43:40, 44:39, 690:37, AR 1.35 (1.14-1.66); 1 preapical antennal seta; L_{pas} 34 (30-40); D_{pd} 177 (156-212); 2 pedicellar setae ventro-medially; H_{sc} 175 (158-212).

HEAD. — W_h 612 (543-707); dorsal ocular apodeme absent to strong; IOS/side 2-4; PtOS/side 10-12; inner verticals reaching to 0.56-0.67 of distance from dorsomedial margin of eye to midline of vertex. Clypeus slightly swollen anteriorly, about as wide as long; CS 9 (6-12). Eyes not hairy, microtrichia not visible laterally, appearing as minute spines antero-medially; dorso-medial margin of eye extending not quite as far or about as far mesad as ventro-medial margin; H_e 266 (241-303). $\bar{L}_{ps_{2-5}}:\bar{W}_{ps_{2-5}}:\text{MaxL}_{pss_{2-5}}$ 93:36:92, 156:40:76, 145:35:67, 204:30:31; D_{so} 14 (12-18); CP 1.02 (0.91-1.18); palpal stoutness 4.34 (3.44-5.08).

THORAX. — L_{th} 1.04 (0.90-1.21) mm (n = 4), D_{th} 1.08 (0.95-1.26) mm (n = 4). Antepronotum with medial commissure strong, but not reaching to rear margin of phragma I, reaching to but not surpassing anterior margin of scutal process; antepronotal notch ranging from weak, with medial corners rounded and scarcely surpassing scutal process, to weak but acute, with more sharply rounded medial corners; LAS/side 7 (5-10); postpronotum without setae and with 0-2 small, indistinct sensilla (?) on antero-dorsal border; dorsocentrals uniserial; DCS/side 9 (6-11), MaxL_{dcs} 165 (145-212) (n = 4); PAS/side 6 (4-9); humeral scar a weak, roughened, irregular area just anterior to dorsal 0.2 of parapsidal suture; scutellar setae in 1 or 2 irregular rows; ScS about 13 (8-about 20), MaxL_{scs} 137 (119-158); ASR 0.63 (0.62-0.66); 0-about 6 setae on epimeral II protuberance; 1 specimen with 2 small setae on preepisternum II just below anapleural suture.

WING. — L_w 3.2 (2.6-4.2) mm, W_w 1.01 (0.88-1.28) mm. Costal projection 87 (59-129) or 4.8 (3.8-5.9) times its width; apparent m-cu distal to apparent fCu by 2-4 times width of apparent m-cu; VR 0.92 (0.90-0.95). Remigium with 1 strong seta on hand, 0(?)-1 weak seta and about 13-18 campaniform sensilla just beyond wrist, and 2 setae and 4-5 large and about 8-10 smaller campaniform sensilla on distal 0.5 of forearm. Setae 14 (8-19) on R, 11 (9-15) on R_1, and 3 (2-5) on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 3 ventrally on Sc just beyond arculus, 2-3 dorsally on R_1, 1 dorsally and 0-1 ventrally near base of R_{2+3}, and 2-3 dorsally on R_{4+5}. Squama with 24-45 (n = 4) strong setae, MaxL_{sqs} 108-190 (n = 3).

LEGS. — $\bar{L}_{p_I}:\bar{L}_{tot}$ 1.17; Fe I with very sparse postero-dorsal beard of only 2-4 long setae. Apical spur of Ti I long, slender, with sparse prickles on basal 0.2-0.4; $L_{atispIII}$ 45-60, $L_{ptispIII}$ 60-93; apical tibial spurs otherwise essentially as in *D. mendotae.* Weak polygon pattern occasionally barely visible near apex of Ti I. Ti III with posterior comb of about 15-18 spines arranged in a fairly regular single row. Spiniform setae on first 3 tarsomeres of P I-III as follows: 2 (apical)-3, 2 (apical). 0-2 (apical); 9-15, 2 (apical)-4, 0-2 (apical); 8-14, 3-8, 2 (apical)-3. Lengths and ratios of leg segments as follows:

	Fe	Ti	Tm_1	Tm_{2-5}	LR	BV	SV
P_I	1300 (1075-1630)	1500 (1210-1860)	1080 (840-1310)	1140 (960-1430)	0.72 (0.69-0.75)	3.34 (3.23-3.52)	2.60 (2.49-2.72)
P_{II}	1460 (1175-1860)	1430 (1175-1725)	750 (600-940)	900 (710-1140)	0.53 (0.50-0.55)	4.04 (3.90-4.16)	3.85 (3.72-4.00)
P_{III}	1660 (1330-2100)	1740 (1390-2160)	1180 (960-1430)	1180 (990-1450)	0.68 (0.65-0.70)	3.87 (3.71-4.06)	2.86 (2.72-3.00)

HYPOPYGIUM (without reference to *D. mendotae*). — Fig. 111. Tg IX with 12-18 setae/side; anal point moderate, about as long as Tg IX, either without apical peg or with apical peg in deep depression; apodemes on underside of Tg IX absent or only weak, forming a "T". L_{gncx} 273 (243-309); $\bar{L}_{tot}:\bar{L}_{gncx}$ 16. Basal plate scarcely developed, with microtrichia ventrally. Medial field only very weakly developed, without well-delimited dorsal border, with numerous microtrichia and setae; distal end of medial field not free. Gonostylus broad in apical 0.6, narrowing fairly sharply proximally. Sternapodeme a fairly simple arch slightly broadening medially. Basal wedge short but well developed, rugose laterally.

DIAGNOSIS. — Antenna plumose, eyes not hairy; anal point present; medial field only weakly developed; gonostylus abruptly narrowed proximally. *D. aberrata* is similar but has a shorter anal point and a more slender gonostylus.

MATERIAL EXAMINED. — *Alaska,* various localities around Anchorage, July 1964, Sept. 1964, 1966, 6 males (USNM); various localities on Kenai Peninsula, June, July, August 1965, leg. K. M. Sommerman, jeep trap, about 70 males (USNM); Old Matanuska to Eklutna, 22 June 1964, jeep trap, 11:00-12:10 AM, 64-15, KMS, 1 male (USNM); Palmer, 23.IX.1964, K. M. Sommerman, jeep trap, 1 male (USNM); [*British Columbia,* presumably], U. B. C., 18.3.39, A. MG., 6, 1 male (UBC); *East Greenland,* Jameson Land, 4-14.viii.1933, D. Lack, B. M. 1933-233 [det. as *D. aberrata*], 2 males (BMNH); *Greenland,* Etah, August 16, '08, Peary's North Pole Exp. 1908, 1 male (USNM); [*Greenland*], Can. Nat. Collection, Nedre Midsommer So Greenland, coll: 3.VII.1966, Can. Peary Land Expd., from GP.30.185, 1 male with larval and pupal exuviae (CNC); [*North West Territories*], Clyde River, Baffin Island, 15-IX-1935, W. J. Brown, 2 males (CNC); ND.16.3 Devon Is, 5.IX.60, Devon Is. Expd., coll. D. R. Oliver, 9 males (CNC); Ellesmer [sic] Land, Ward Hunt I., 20 June 1960, Spokas, coll, #3 *Diamesa simplex* Kieffer ♂ [det. ?], 1 male (USNM); Hazen Camp, NE.210, NE.228, NE.232, Ellesmere I., 10, 13.VIII.1961, D. R. Oliver, *Diamesa simplex* Kief. det 1962, D. R. Oliver, 22 pupae (CNC); Truelove R., Devon I., N. W. T., 5 Sept. 1960, coll. D. R. Oliver, *Diamesa,* det. D. R. Oliver, ND.16, 1 male (CNC); ND.17-7, Truelove R., Devon Is., 5.IX.60, Devon Is. Exp., coll. D. R. Oliver, 3 males (CNC); ND.17, Truelove R., Devon Is., 5.IX.60, D. R. Oliver, numerous pupae (CNC); [*Quebec*], Gt. Whale R., P. Q. 9.IX.1949, J. R. Vockeroth, 1 male (CNC); *Wyoming,* 44°10'N, 107°05'W, Powder River Pass, 18 mi W, 13 mi S of Buffalo, alt. 9,600', sweeping in spruce-fir forest, 26, 27 Aug. 1967, leg. D. Hansen, 2 males (UMn).

DISCUSSION. — Kieffer (1926) described *simplex* from a single male from the Zoological Museum of Oslo. The specimen had been collected by Per Schei, the geologist and palaeontologist on the Second Norwegian Arctic Expedition in the "Fram," at "Havnen." Havnen is Havnefjord or Harbour Fjord on the southern coast of Ellesmere Island. Fortunately, Kieffer did illustrate the gonostylus. Oliver (1959) examined the holotype at Oslo and found that the hypopygium was badly damaged. At that time he had not seen *aberrata* and felt that Andersen (1937) was probably correct in synonymizing *simplex* with *aberrata.* Oliver (1962) later examined Lundbeck's series of *aberrata,* however, and established that *simplex* is a distinct species.

D. simplex has previously been recorded from Ellesmere Island (Kieffer, 1926), Jameson Land, East Greenland (Edwards, 1935, misdetermined as *aberrata*), and north east Greenland (Andersen, 1937, misdetermined as *aberrata*). I have seen additional arctic specimens from Etah and south Greenland and Baffin, Devon, and Ellesmere Islands. Interestingly, however, the species also extends into Alaska and down the Rocky Mountains into British Columbia and Wyoming. It must also have one of the most far northern records of any insect: one specimen is from Ward Hunt Island. Only Peary Land in Greenland extends farther north.

Location of type. — Holotype at the Zoological Museum of Oslo (Oliver, 1959).

Diamesa sommermani new species

Description (unless otherwise stated, n = 1 and measurements are in microns): as in *D. mendotae* except:

Total length. — not noted before slide mounting.

Coloration. — not noted before slide mounting.

Antenna. — longest flagellar seta $0.64L_{fl}$; Flm_{13} with apical 0.23 spindle-shaped, mainly swollen ventrally; 2 short, slender setae dorso- and ventro-medially on Flm_1; long (MaxL 859) flagellar setae 1 on Flm_1, 3 on Flm_2, 6 on Flm_3, about 10 on Flm_4, increasing to 14 on Flm_{12}, numerous on Flm_{13}; setae on basal 0.1 of spindle-shaped region of Flm_{13}; small, blunt sensilla basiconica 2 ventrally on Flm_1, 1 on $Flm_{2\,\&\,3}$; spindle-shaped region of Flm_{13} with sensilla as in *D. mendotae* except with only 1 blunt sensillum basiconicum arising from distinct pit; $L_{flm_{1-13}}:W_{flm_{1-13}}$ 105:56, 22:49, 27:51, 27:46, 32:46, 32:46, 32:46, 34:46, 39:46, 39:44, 44:41, 49:44, 788:41; AR 1.45; 1 preapical antennal seta; L_{pas} 40; D_{pd} 190; 4-5 pedicellar setae ventromedially (n = 2); H_{sc} 208.

Head. — W_h 720; dorsal ocular apodeme moderate; epistomal suture strong to weak medially, weak to nearly absent laterally (n = 5); IOS/side 6, 7; PtOS/side 14-16; inner verticals reaching to 0.60 of distance from dorso-medial margin of eye to midline of vertex. Clypeus slightly swollen anteriorly, about as wide as long; CS 17. Eyes not hairy, microtrichia visible as minute points antero-medially, not visible laterally; dorso-medial margin extending not quite as far mesad as ventro-medial margin; H_e 326. $L_{ps_{2-5}}:W_{ps_{2-5}}:MaxL_{pss_{2-5}}$ 127:46:90, 183:54:90, 190:44:78, 244:37:54; D_{so} 20; CP 0.96; palpal stoutness 4.13.

Thorax. — L_{th} 1.52 (1.43-1.65) mm, D_{th} 1.47 (1.38-1.56) mm (n = 6). Antepronotum with medial commissure strong, not reaching rear margin of phragma I, slightly surpassing anterior margin of scutal process; antepronotal notch slightly obtuse, with medial corners rounded and well surpassing scutal process; LAS/side about 6. Postpronotum without setae, and with sensilla not visible on antero-dorsal border in slides available. Dorsocentrals uniserial; DCS/side 12-16, $MaxL_{dcs}$ about 170 (n = 2); PAS/side about 9; ScS about 48, $MaxL_{scs}$ 200-250 (n = 2); ASR 0.63; 3 setae on epimeral II protuberance.

WING. — L_w 3.5 (3.1-3.8) mm, W_w 1.23 (1.11-1.38) mm. Dry wing not available. Slide mounted wing showing: costal projection 96 (68-122) or 4.4 (3.0-5.6) times its width; R_1 slightly to moderately (i.e., distal 0.2 slightly less than 2 times as wide as proximal 0.2) enlarged distally; apparent m-cu distal to apparent fCu by about 1-4 times width of apparent m-cu; VR 0.91 (0.86-0.93). Remigium with 2 strong setae on hand (n = 1), 0(?) setae and about 18 campaniform sensilla just beyond wrist (n = 1), and 2-4 setae and 4 large and about 9 smaller campaniform sensilla on distal 0.5 of forearm. Setae 17 (13-20) on R, 12 (9-15) on R_1, and 7 (2-11) on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 3 ventrally on Sc just beyond arculus, 2-3 dorsally on R_1, 1 dorsally and 1 ventrally near base of R_{2+3}, and 2-5 dorsally on R_{4+5}. Squama with 68-82 (n = 2) strong setae, $MaxL_{sqs}$ 183-203 (n = 3).

LEGS. — $L_{p_I}:L_{tqt}$ not measurable on slides available. Fe I with sparse postero-dorsal beard of about 10 long setae. L_{tispI} 102; apical spurs otherwise essentially as in *D. mendotae*. Weak polygon pattern barely visible near apex of Ti I; polygon pattern on Ti III moderately developed. Spiniform setae on first 3 tarsomeres of P I-III as follows: 4, 2, 0; 15, 3, 0; 22, 6, 1 (at about 0.6). Lengths and ratios of leg segments as follows:

	Fe	Ti	Tm_1	Tm_{2-5}	LR	BV	SV
P_I	1562	1825	1336	1378	0.73	3.43	2.54
P_{II}	1758	1690	857	1008	0.51	4.27	4.02
P_{III}	1994	2063	1344	1327	0.65	4.07	3.02

HYPOPYGIUM (without reference to *D. mendotae*). — Fig. 135. Tg IX with 17, 18 setae/side. Anal point strong, slender distally, broadening slightly basally, with short terminal peg set in small depression; strong apodemes on underside of Tg IX diverging from base of anal point and arching to antero-lateral corners of Tg IX; L_{gncx} 384. Basal plate weakly developed, with microtrichia ventrally. Medial field well developed, but obscured in dorsal view by very strong postero-dorsal projection of gonocoxite. Gonostylus fairly long, slender, about of equal width throughout, with subterminal peg and very short terminal ridge. Sternapodeme quite broad medially, without antero-lateral projections; fore margin roughly straight medially. Basal wedge fairly short but strong, rugose.

DIAGNOSIS. — The large thumb-like projection of the gonocoxite is unique among described *Diamesa*.

MATERIAL EXAMINED. — *Alaska*, Anchorage-Granite Creek, 8 Sept. 1966, K. M. Sommerman, jeep trap 66-47, 2 males (USNM); Anchorage-Seward Hwy., 25 Aug. 1964, K. Sommerman, jeep trap, 1 male (USNM); Kenai Pen., Johnson L.-Soldatna, 19 June 1965, K. M. Sommerman, jeep trap, 2 males (USNM); Kenai Pen., 17 June 1965, jeep trap 65-2, 9:10-10:50 PM, Primrose-Seward and back, K. M. Sommerman, 1 male (holotype) (USNM); Kenai Pen., Seward-Primrose CG, 17 June 1965, K. M. Sommerman, jeep trap, 1 male (USNM); Kenai Pen., Wildwood-Soldatna, 18 June 1965, K. M. Sommerman, jeep trap, 1 male (USNM); Matanuska, Eklutna Hwy., 22 June 1964, K. M. Sommerman, jeep trap, 1 male (USNM); Palmer, 23 Sept. 1964, K. Sommerman, jeep trap, 1 male, (USNM); Seward Hwy., Mud L.-Kenai L.-Summit L., 20 IX 1965, K. M. Sommerman, jeep trap 65-22, 2 males (USNM); Seward Hwy., Mud L.-Summit L. Lodge, 2 Sept. 1965, K. M. Sommerman, jeep trap 65-20, 4 males (USNM).

Discussion. — *D. sommermani* is described from material collected in Alaska. The species is distinctive with its large postero-dorsal projection on the gonocoxite. *D. sommermani* is named in honor of Dr. Kathryn M. Sommerman, who collected long series of several species of *Diamesa* on various trips in Alaska with her "jeep trap." Without this material my study would have had very few representatives from Alaska, and I am very grateful to Dr. Sommerman for her collecting efforts.

Location of type. — Holotype is a slide-mounted male collected: USA, Alaska, Kenai Pen[insula], June 17, 1965, Jeep trap 65-2, 9:10-10:50 PM. Primrose-Seward and back, [leg.] K. M. Sommerman; it is deposited in the USNM. The other specimens examined are designated as paratypes and are deposited in the USNM and UMn.

Diamesa spinacies Saether

D. spinacies Saether, 1969: 27-33 (described from 1 male reared from a pupa, female pupa with larval exuviae, larvae, from Alberta).

D. arctica (Boheman). Young, 1969: 1204 (misdetermination by D. Hansen).

Description (unless otherwise stated, n = 5 and measurements are in microns): as in *D. mendotae* except:

Total length. — 5.5 (4.9-6.3) mm.

Coloration (pinned specimen). — as in *D. mendotae* except: haltere with capitellum and distal 0.4 of shaft pale; base light brown.

Antenna. — longest flagellar seta 0.60 (0.54-0.66)L_{fl}; Flm_{13} with apical 0.16-0.26 spindle-shaped, mainly swollen ventrally; 2-4 short, slender setae dorso- and ventro-medially on Flm_1; long (MaxL 717-952) flagellar setae 1 on Flm_1, 3-4 on Flm_2, 5-9 on Flm_3, increasing to 13-16 on Flm_{12}, numerous on Flm_{13}; $\bar{L}_{flm_{1-13}} : \bar{W}_{flm_{1-13}}$ 104:59, 22:49, 26:49, 29:49, 28:47, 29:46, 31:44, 31:43, 36:43, 37:41, 39:40, 42:40, 899:39; AR 1.72 (1.58-1.96); 1 preapical antennal seta; L_{pas} 42 (29-51): D_{pd} 197 (181-210); 2-4 pedicellar setae ventro-medially; H_{sc} 211 (193-224).

Head. — W_h 698 (655-737); dorsal ocular apodeme weak to strong; IOS/side 5 (3-6); a pair of medial vertex setae rarely present (Fig. 51); PtOS/side 12-18; outer verticals 6-9; inner verticals reaching to 0.53-0.67 of distance from dorso-medial margin of eye to midline of vertex; clypeus slightly swollen anteriorly, about as long as wide; CS 17 (12-24). Eyes not hairy, microtrichia not visible laterally, visible as tiny spines between ommatidia antero-medially; H_e 318 (298-341). $\bar{L}_{ps_{2-5}} : \bar{W}_{ps_{2-5}}$:

$\overline{MaxL}_{pss_{2-5}}$ 123:43:109, 174:50:109, 175:40:97, 250:33:41; D_{so} 16 (14-18); CP 0.96 (0.88-1.00); palpal stoutness 4.45 (3.87-4.79).

THORAX. — L_{th} 1.52 (1.38-1.67) mm, D_{th} 1.44 (1.31-1.55) mm. Antepronotal notch right-angled or slightly obtuse, medial corners rounded, well surpassing scutal process; LAS/side 9 (7-14); postpronotum without setae, but with 1-2 faint sensilla (?) on antero-dorsal border; dorsocentrals usually uniserial, or, if numerous, row staggered posteriorly; DCS/side 10 (7-14), $MaxL_{dcs}$ 187 (158-218); PAS/side 11 (7-16); ScS about 30-42; ASR 0.65 (0.61-0.69); 1-9 setae on epimeral II protuberance.

WING. — L_w 4.0 (3.5-4.6) mm, W_w 1.29 (1.08-1.53) mm. Dry wing not available. Slide mounted wing showing: costal projection 110 (100-120) or 5.7 (5.0-6.1) times its width; Sc as in *D. mendotae* except not quite reaching C; apparent m-cu distal to apparent fCu by about 2-4 times width of apparent m-cu; VR 0.90 (0.88-0.92). Remigium with 1 strong or 1 strong and 1 weak seta on hand, 1-3 setae and about 15 campaniform sensilla just beyond wrist, and 3-4 setae and about 4 large and 8-12 smaller campaniform sensilla on distal 0.5 of forearm. Setae 16 (13-19) on R, 11 (9-12) on R_1, and 5 (3-8) on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 3-4 ventrally on Sc just beyond arculus, 2 dorsally on R_1, 1 dorsally and 1 ventrally near base of R_{2+3}, and 3-4 dorsally on R_{4+5}. Squama with 35-87 (n = 3) strong setae, $MaxL_{sqs}$ 184-237 (n = 3).

LEGS. — $\overline{L}_{p_I}:\overline{L}_{tot}$ 1.06. Apical tibial spurs essentially as in *D. mendotae*. Polygon pattern on Ti III well developed. Spiniform setae on first 3 tarsomeres of P I-III as follows: 2 (apical)-8, 2 (apical), 0; 11-13, 2 (apical)-5, 0; 16-26, 7-10, 0-1 (at about 0.7). Lengths and ratios of leg segments as follows:

	Fe	Ti	Tm_1	Tm_{2-5}	LR	BV	SV
P_I	1300 (1080–1630)	1500 (1210–1860)	1080 (840–1310)	1340 (960–1430)	0.72 (0.69–0.75)	3.34 (3.23–3.52)	2.60 (2.49–2.72)
P_{II}	1460 (1180–1860)	1430 (1180–1720)	750 (600–940)	900 (710–1140)	0.53 (0.50–0.55)	4.04 (3.90–4.16)	3.85 (3.72–4.00)
P_{III}	1660 (1330–2100)	1740 (1400–2160)	1180 (960–1430)	1180 (990–1450)	0.68 (0.65–0.70)	3.87 (3.71–4.06)	2.86 (2.72–3.00)

HYPOPYGIUM (without reference to *D. mendotae*). — Fig. 133. Tg IX with 12 (5-16) setae/side. Anal point fairly long, slender, broadening basally; well developed apodemes on underside of Tg IX diverging from base of anal point, running to antero-lateral corners of Tg IX. L_{gnex} 319 (295-342); $L_{tot}:L_{gnex}$ 17. Basal plate fairly well developed, with numerous microtrichia ventrally, margin obtuse to right-angled disto-medially. Medial field well developed, with well-delimited dorsal border, with numerous microtrichia and setae; distal end of medial field free. Gonostylus slender, broadest at about 0.3, slightly tapering apically, with subterminal peg and terminal ridge. Sternapodeme a fairly simple slender arch. Basal wedge short but well-developed, rugose laterally.

Diagnosis. — Antenna plumose, eyes not hairy; medial field well-developed, distal end free, dorsal border well-delimited; gonostylus broadest at about 0.3 its length. *D. arctica* is very similar, but its gonostylus is longer and is narrowed more basally and more abruptly and is more slender distally.

Material examined. — *Alaska,* various localities around Anchorage, Aug. and Sept. 1964, 1965, 1966, jeep trap, leg. K. M. Sommerman, 11 males (USNM); Canada, *Alberta,* large mountain stream, Rowe Creek, above highway to Cameron Lake, Waterton National Park, 21.VII.1967, leg. A. L. Hamilton and O. A. Saether, 1 male with pupal exuviae, holotype, CNC type no. 9974 (CNC); *California,* Mono County, Sonora Pass, Leavitt Creek, elv. 8,000′, 18 July 1968, light trap, leg. R. Hellenthal, 3 males (UMn); *California,* Mono County, White Mts., 3 mi. N of Inyo Co., Alt. 10,150′, near Naval Research Station, N. Fork of Crooked Creek, 20-VIII-1963, flight trap, H. B. Leech, 2 males (CalAcad); *Colorado,* 38°31′N, 106°08′W 3.5 miles W of Poncha Springs, sweeping under bridge over Little Arkansas River, 11 Dec. 1968, leg. D. Hansen, 5 males (UMn); *Idaho,* Fremont-Teton Co. border, N. Fork Teton R. at Hwy. 32, 6 Mar. 1965, leg. A. V. Nebeker, 1 male (ANSP); *Montana,* Glacier National Park, Logan Creek at Going to the Sun Highway, 5,800′, 23 July 1968, leg. R. Hellenthal, light trap, 2 males (UMn); as above, but in drift net, 1 male (UMn); *Utah,* Cache Co., Smithfield, 16 Feb. 1969, leg. R. M. and N. Young, flying during light snow, about 30°F., 12 males (UMn); *Utah,* Cache County, Temple Fork of Logan River, I-26-1968, leg. W. D. Pearson, 2 males (UMn); *Utah,* Salt Lake County, Big Cottonwood Creek, various localities along creek, various dates in Nov., Dec. 1964, Jan. to March, June 1965, numerous males (ANSP and UMn); *Wyoming,* 41°20′N, 106°10′W, 3 mi. NNW of Centennial, by Nash Fork of Little Laramie River, 23 March 1968, leg. D. Hansen, 1 male (UMn); *Wyoming,* 44°10′N, 107°05′W, Powder River Pass, 18 mi. W, 13 mi. S of Buffalo, alt. 9,600′, sweeping in fir-spruce forest, 26, 27 Aug. 1967, 27 Aug. 1968, leg. D. Hansen, 7 males (UMn); *Wyoming,* 44°57′40″N, 109°29′00″W, alt. 10,300′, 31 mi. N, 21 mi. W of Cody, sweeping above small spring area at dusk, water 3°C, 13 Aug. 1969, leg. D. Hansen, 2 males (UMn); as above, but drift in small, rocky stream feeding Frozen Lake, 7 PM 13 Aug.-9 AM 14 Aug. 1969, leg. D. Hansen, mature male pupa (UMn).

Discussion. — Saether (1969) described *spinacies* from a male reared from a pupa, a female pupa, pupal exuviae, and larvae. Saether illustrates the hypopygium and shows a fine distal spine on the anal point. I examined the holotype and really can't say that this spine is not just the broken off end of a seta, probably from the gonocoxite. None of my specimens of *spinacies* have such a spine, although they generally agree with the holotype in other respects. The holotype had a lower AR and fewer clypeal, dorsocentral, and prealar setae. The holotype is smaller than the specimens I examined, however, and a reduced number of setae is often found in small specimens of a species.

Until I saw specimens of *arctica,* I was misdetermining *spinacies* as *arctica.* The two species are quite close, differing mainly in the shape of the gonostylus.

Saether described *spinacies* from Alberta. I have seen additional specimens from Alaska, California, Colorado, Idaho, Montana, Utah, and Wyoming. At lower elevations it emerges in the winter (and also in the summer?); higher in the mountains it has been collected in the summer months. Streams near or from which I have collected *spinacies* are shown in Figs. 31 and 33.

Location of types. — Holotype at the CNC; paratypes at the Freshwater Institute, Winnipeg (and the CNC?) (Saether, 1969).

Diamesa vockerothi new species

Description (unless otherwise stated, n = 5 and measurements are in microns): as in *D. mendotae* except:

Total length. — 5.7 (4.8-6.4) mm (n = 10).

Coloration (alcohol specimen). — medium to light brown, lateral scutal stripes darker, less pruinose; legs slightly lighter brown; tip of haltere white.

Antenna. — longest flagellar seta 0.71 (0.66-0.75)L_{fl}; Flm_{13} with apical 0.15-0.17 spindle-shaped, mainly swollen ventrally; 2-4 short, slender setae dorso- and ventro-medially on Flm_1; long (MaxL 1126-1229) flagellar setae 1 on Flm_1, 4 on Flm_2, 8-10 on Flm_3, 9-11 on Flm_4, increasing to about 14-16 on Flm_{12}, numerous on Flm_{13}; setae on basal 0.1-0.2 of spindle-shaped region of Flm_{13}; $\bar{L}_{flm_{1\text{-}13}}:\bar{W}_{flm_{1\text{-}13}}$ 111:76, 22:62, 25:62, 26:58, 25:59, 24:56, 22:56, 22:55, 26:54, 26:51, 28:50, 31:48, 1197:47; AR 2.67 (2.53-2.82); 1 or 2 preapical antennal setae; L_{pas} 37 (32-42); D_{pd} 222 (205-234); 1 or 2 pedicellar setae ventro-medially; H_{sc} 235 (213-246).

Head. — W_h 807 (768-840); dorsal ocular apodeme weak; epistomal suture strong to weak medially, weak to absent laterally; IOS/side 5 (2-6); PtOS/side 13-17; inner verticals reaching to 0.58 (0.50-0.65) of distance from dorso-medial margin of eye to midline of vertex. CS 17 (10-24); H_e 353 (322-369). $\bar{L}_{ps_{2\text{-}5}}:\bar{W}_{ps_{2\text{-}5}}:\overline{MaxL}_{pss_{2\text{-}5}}$ 142:48:154, 207:56:207, 189:44:162, 254:37:36; D_{so} 19 (16-24); CP 1.02 (0.97-1.04); palpal stoutness 4.22 (4.05-4.41).

Thorax. — L_{th} 1.56 (1.38-1.63) mm, D_{th} 1.48 (1.33-1.55) mm. Antepronotum with medial commissure strong, not quite reaching to rear margin of phragma I, slightly to well surpassing anterior margin of scutal process; antepronotal notch weak, acute to obtuse, with medial corners rounded; LAS/side 8 (6-11). Dorsocentrals uniserial or slightly staggered posteriorly; DCS/side 10.5 (8-13), $MaxL_{dcs}$ 236 (188-262); PAS/side 10 (8-12); Scs 37 (27-44), $MaxL_{scs}$ 268 (229-311); ASR 0.62 (0.59-0.64); 1-4 setae on epimeral II protuberance.

Wing. — L_w 4.3 (3.9-4.4) mm, W_w 1.31 (1.21-1.39) mm. Dry wing not available. Slide mounted wing showing: costal projection 142 (115-170) or 6.8 (5.8-8.9) times its width; VR 0.92 (0.91-0.94). Remigium with 1 strong seta on hand, 0-1 weak seta and about 11-16 campaniform sensilla just beyond wrist, and 2-3 setae and 4 large and about 6-11 smaller campaniform sensilla on distal 0.5 of forearm. Setae 16 (13-20) on R, 10 (8-11) on R_1, and 7 (5-8) on R_{4+5} (uniserial and dorsal on all). Campaniform sensilla 3 ventrally on Sc just beyond arculus, 2-3 dorsally on R_1, 1-2 dorsally and 1 ventrally near base of R_{2+3}, and 2-7 dorsally on R_{4+5}. Squama with 43-61 strong setae, $MaxL_{sqs}$ 188-229.

LEGS. — $\overline{L}_{p_I}:\overline{L}_{tot}$ 1.16; Fe I with moderate postero-dorsal beard of about 10-20 long setae on proximal 0.5. Apical spur of Ti I long, slender, with somewhat sparse prickles on basal 0.3-0.4; L_{tispI} 100 (90-107); apical spurs otherwise essentially as in *D. mendotae*. Ti III with posterior comb of about 19-23 spines arranged in a fairly regular single row. Spiniform setae on first 3 tarsomeres of P I-III as follows: 4-9, 2-3, 0-1 (at about 0.7); 9-12, 5-7, 0-2 (at about 0.6); 13-17, 8-10, 0-2 (at about 0.5). Lengths and ratios of leg segments as follows:

	Fe	Ti	Tm_1	$Tm_{2\text{-}5}$	LR	BV	SV
P_I	1810 (1680–1890)	2040 (1860–2100)	1350 (1210–1450)	1430 (1360–1510)	0.66 (0.64–0.69)	3.65 (3.49–3.75)	2.85 (2.75–2.92)
P_{II}	1990 (1830–2060)	1850 (1690–1960)	900 (820–940)	1140 (1080–1180)	0.49 (0.47–0.50)	4.17 (4.04–4.32)	4.27 (4.17–4.35)
P_{III}	2240 (1990–2370)	2240 (2060–2370)	1430 (1230–1580)	1500 (1330–1650)	0.64 (0.59–0.67)	3.96 (3.83–4.11)	3.14 (3.00–3.31)

HYPOPYGIUM (without reference to *D. mendotae*). — Figs. 127, 128. Tg IX with 14 (10-17) setae/side. Anal point strong, broadening just slightly basally, usually with short apical peg; strong apodemes on underside of Tg IX diverging, arching to antero-lateral corners of Tg IX; L_{gncx} 351 (328-374); $\overline{L}_{tot}:\overline{L}_{gncx}$ 16. Basal plate quite well developed, but with disto-medial margin not projecting. Medial field well developed, dorsal border fairly well delimited, becoming just slightly free from gonocoxite distally; medial field with numerous microtrichia, with setae particularly strong ventrally; distal end of medial field fairly broad, slightly curving mesad; medial field with 3-8 setae in proximo-dorsal corner. Basimedial setal cluster with numerous extremely long, strong setae radiating fan-like, longest setae reaching beyond mid-line of opposite gonocoxite. Gonostylus broadest at about 0.5, with subterminal peg and short terminal ridge. Sternapodeme slender medially, with or without anterolateral projection; fore margin straight to moderately concave medially. Basal wedge quite strong, rugose, extending not quite to distal end of basal plates.

DIAGNOSIS. — Antenna plumose, eyes hairy; basal plate not produced disto-medially; basimedial setal cluster strong; medial field with distal end free, broad, directed postero-mesad.

MATERIAL EXAMINED. — *Ontario*, Bells Corners, 21.III.1956, G. E. Shewell, on snow beside semi-permanent low-land stream, 3″-1′ deep, 3′-5′ wide, bottom rocky and pebbly with moss, *Diamesa nivoriunda* (Fitch), det. 1956 J. R. Vockeroth, 11 males, 9 females (all teneral) (CNC); Loon Lake nr. Essonville, 15-III-1965, Martin and McAlpine, 3 males (CNC); Ottawa, 21.III.1957, J. R. Vockeroth, about 30 males (CNC): Ottawa, 31.III.1957, J. R. Vockeroth, *Diamesa nivoriunda* (Fitch), det. J. R. V. '57, numerous males (CNC); *Quebec*, Gatineau Pk., Notch Rd. Q 10/2, 6.III.1966, D. R. Oliver, 9 males, 1 female (CNC); Gatineau Pk., Q-15-1, 1.III.1964, D. R. Oliver, 5 males (CNC); Old Chelsea, 28.III.1958, J. R. Vockeroth, *Diamesa nivoriunda* Fitch det J. R. V. '58, 2 males, 4 females (CNC); Shawano, Gatineau Park, 26.II.1966, P. S. Corbet, 1 male (CNC).

LOCATION OF TYPES. — Holotype is a slide-mounted male collected: Ontario, Ottawa, 21.III.1957, J. R. Vockeroth, slide DH70-60; it is deposited in the CNC. All other male specimens examined are designated as paratypes and are deposited in the CNC and UMn.

DISCUSSION. — *D. vockerothi* has been collected at a few localities in Ontario and Quebec. The species is named in honor of Dr. J. R. Vockeroth, the collector of a long series of specimens and an excellent Dipterist. The species has the highest AR (up to 2.82) of any species of *Diamesa* I know of.

LIST OF SYNONYMS OR PREOCCUPIED NAMES

banana Garrett (= *heteropus*)
biappendiculata Goetgh. (= *geminata*)
borealis (*Entanypus*) Coq. (= *coquilletti* Sublette; see also *heteropus*)
borealis Garrett (preoccupied; = *garretti* Sublette and Sublette)
Brachydiamesa sp. II Thienemann, 1936 (= ?*lindrothi*)
caena Roback (= *leona*)
confusa (*Adiamesa*) Garrett (= *heteropus*)
D. sp. I Pagast (see *geminata*)
D. sp. II Thienemann, 1941; Pagast, 1947 (see *bertrami*)
D. sp. VII Thienemann, 1941; Pagast, 1947 (= *incallida*)
edwardsi Goetgh. (= *bohemani*)
fonticola Saether (= *incallida*)
furcata Edw. (= *geminata*)
nexilis Walker (= *incallida*)
onteona Roback (= *heteropus*)
pieta Roback (= *leona*)
poultoni Edw. (= *arctica*)
prolongata Kieff. (= *insignipes*)
waltlii Meigen (see: *aberrata, bohemani, chiobates, nivoriunda*)

OTHER SPECIES RECORDED AS DIAMESA

Several other species assigned to *Diamesa* at one time or another have been described or recorded from the Nearctic. My placement of these species is as follows:

D. appendiculata Lundstroem 1918(?): 23-24, Fig. 35 (described from arctic Siberia). Sublette determined specimens from the Cape Thompson Region, Alaska (recorded in Watson, D. G., J. J. Davis, and W. C. Hanson. 1966. Ch. 21. Terrestrial Invertebrates, p. 565-584. *In* Wilimovsky, N. J., *ed.* Environment of the Cape Thompson region, Alaska. U.S. Atomic Energy Commission, Division of Technical Information, Oak Ridge. xvi + 1250 p., maps). I have seen these specimens and am certain the species does not belong in *Diamesa.* The gonostylus is somewhat similar to *Paraheptagyia tasmaniae* (Freeman) (Brundin, 1966), although the phallapodeme and other hypopygial features are nearer to *Sympotthastia fulva.* I really don't know where it belongs.

D. fulva Johannsen. Sublette and Sublette (1965: 151) listed *fulva* as a *Diamesa,* and Sublette (1967b: 480-483) later redescribed the type material and regarded *fulva* as a *Diamesa.* I am regarding it as a *Sympotthastia* Pagast.

D. longimanus (Kieffer). Sublette and Sublette (1965: 151) regard *Potthastia* Kieffer as a junior synonym of *Diamesa.* I regard *Potthastia* as a distinct genus. The nearctic species of *Potthastia* are *longimanus* Kieff., *gaedii* (Meigen), possibly *montium* (Edw.), and a new species from Wyoming near *montium.*

D. parva Edw. Sublette and Sublette (1965: 152) regard *parva* as a *Diamesa.* I regard it as belonging to *Diplomesa* Pagast (= "*Pseudokiefferiella*" Zavrel).

D. polaris Kieffer 1926: 79. Kieffer described *polaris* from a female from "Rice Straith" (eastern coast of Ellesmere Island). The brown haltere and shape of r-m ("T[1]") mentioned by Kieffer suggest that *polaris* is a *Diplomesa.* I'd be inclined to call it a *nomen dubium.*

D. sequax (Garrett). Sublette and Sublette (1965: 152) included *sequax* in *Diamesa.* Sublette (1967a: 305-306) later erected the monotypic genus *Hesperodiamesa* for *sequax.*

D. ursus Kieffer. Edwards (1935: 470) recorded 7 females from eastern Greenland. At this point, I simply can't determine female *Diamesa* with any certainty and would regard Edwards' determination as being questionable.

D. waltlii Meigen. Johannsen (1903: 439, 441, pls. 47, 48; 1921: 230-232) misdetermined *D. nivoriunda* as "*Waltlii.*" Malloch (1915: 410-411; Fig. 11, pl. 23; Fig. 3, pl. 29; Fig. 1, pl. 35) recorded *D. waltlii* from Maryland, Colorado, and Montana. He also described the larva, pupa, and adult, stating that the larvae were common in the Illinois River. The hypopygial figure looks like *D. heteropus* or *chiobates.* I have not seen Malloch's material, but I suspect the Montana and Colorado records are probably *heteropus,* the Maryland record *nivoriunda.* Knowlton (1931: Can. Ent. 63: 152) recorded *D. waltlii* from Utah. I have not seen his specimens, but he probably was seeing *heteropus.* Cole (1969: 99) cites literature records of *waltlii.* Again, *heteropus* is probably the species originally seen.

List of Abbreviations

Abbreviations used in the descriptions.

AcS	acrostichal setae
AR	antennal ratio (Fig. 47)
BV	see Fig. 146
CP	ratio of head width to palpal length
CS	clypeal setae
DCS	dorsocentral setae
D_{pd}	diameter of pedicel
D_{so}	diameter of sunken organ (Fig. 57)

D_{th}	depth of thorax (Fig. 143)
Fe I, II, III	fore, mid, and hind femur, respectively
flm_n	n^{th} flagellomere
fR	point of forking of radius to form R_1, R_{2+3}, and R_{4+5}
H_e	height of eye (Fig. 142)
H_{sc}	height of scape (Fig. 142)
IOS	interocular setae (Fig. 48)
LAS	lateral antepronotal setae (Fig. 78)
$L_{atispIII}$	length of antero-ventral spur on hind tibia
L_{fl}	length of flagellum
$L_{flm_{1-13}}$	length of each flagellomere (Fig. 39)
L_{gncx}	length of gonocoxite
L_{pas}	length of preapical antennal seta
L_{pI}	length of fore leg
$L_{ptispIII}$	length of postero-ventral spur on hind tibia
$L_{ps_{2-5}}$	length of palpal segments 2 to 5 (Fig. 57)
LR	leg ratio
L_{th}	length of thorax (Fig. 143)
L_{tispI}	length of spur on fore tibia
L_{tot}	total length of insect, from tip of antepronotum to end of hypopygium
L_w	length of wing (Fig. 144)
MaxL	maximum length
$MaxL_{dcs}$	length of longest dorsocentral seta
$MaxL_{pss_{2-5}}$	length of longest seta on palpal segments 2 to 5
$MaxL_{sqs}$	length of longest squamal seta
PAS	prealar setae (Fig. 65)
P I, II, III	fore, mid, and hind legs, respectively
n	number (sample size)
PS_1	first palpal segment (Figs. 48, 56)
PtOS	postocular setae (Fig. 49)
PTP	posterior tentorial pit (Fig. 60)
ScS	scutellar setae
St IX	ninth sternite (Figs. 119, 131)
SV	see Fig. 146
Tg IX	ninth tergite (Fig. 131)
Ti I, II, III	fore, mid, and hind tibia, respectively
Tm_n	n^{th} tarsomere ("tarsal segment")
$W_{flm_{1-13}}$	width of each flagellomere (Fig. 39)
W_h	width of head (excluding height of ommatidia) (Fig. 142)
W_w	maximum width of wing (Fig. 144)
—	bar; average or mean value

Abbreviations of institutions and/or individuals from which material was borrowed.

ANSP	Academy of Natural Sciences of Philadelphia
BM(NH)	British Museum (Natural History), London
CalAcad	California Academy of Sciences (through JES)
CalfInsSur	California Insect Survey (through JES)
CNC	Canadian National Collection, Ottawa
ColStU	Colorado State University, Ft. Collins
Corn	Cornell University, Ithaca
HKT	Dr. Henry K. Townes, American Entomological Institute, Ann Arbor, Michigan
IllNatHstSur	Illinois Natural History Survey, Urbana
JES	Dr. James E. Sublette, Eastern New Mexico University, Portales. New Mexico
UBC	University of British Columbia, Vancouver
UCalDav	University of California, Davis
UId	University of Idaho, Moscow
UMich	University of Michigan, Ann Arbor
UMn	University of Minnesota, St. Paul
USNM	United States National Museum, Washington, D.C.
UtStU	Utah State University, Logan
UWyo	University of Wyoming, Laramie
WashStU	Washington State University, Pullman
WWSU	Western Washington State University, Bellingham

TABLE I. — Wing venation terminologies

Fig. 93		Walker, 1856	Schiner, 1864b	Goetghebuer, 1927	Edwards, 1929
C	costa	costal	Costalader	costale	costa
h	humeral crossvein	—	—	—	—
Sc	subcosta	mediastinal	Mediastinalader	auxiliaire	subcosta
R	radius	subcostal	Subcostalader	radius	radius
R_1		subcostal	Subcostalader	radius	R_1
R_{2+3}		radial	Radialader	2e longitudinal	R_{2+3}
R_{4+5}		cubital	Cubitalader	cubitus	R_{4+5}
r-m	r-m crossvein	praebrachial transverse veinlet	Querader	T_1, transversale anterieure	r-m
M	media	[?]	Discoidalader	discoidale	media
M_{1+2}		subapical	"	discoidale	media
M_{3+4}		[?] subanal	"	P_1, rameau anterieur de la posticale	Cu_1
apparent m-cu		["pobrachial areolet closed"]	Hintere Querader	T_2, transversale posterieure	m-cu
Cu	cubitus	pobrachial	Posticalader	—	cubitus
apparent fCu	apparent forking of Cu	fork of pobrachial vein	—	—	base of cubital fork
Cu_1		[?] anal	Posticalader	P_2, rameau posterieur de la posticale	Cu_2
Vannal fold		—	—	—	—
An	anal vein	[?] subaxillary	Analader	A	An
Anal lobe		—	—	—	anal lobe
Remigium		—	—	—	stem vein

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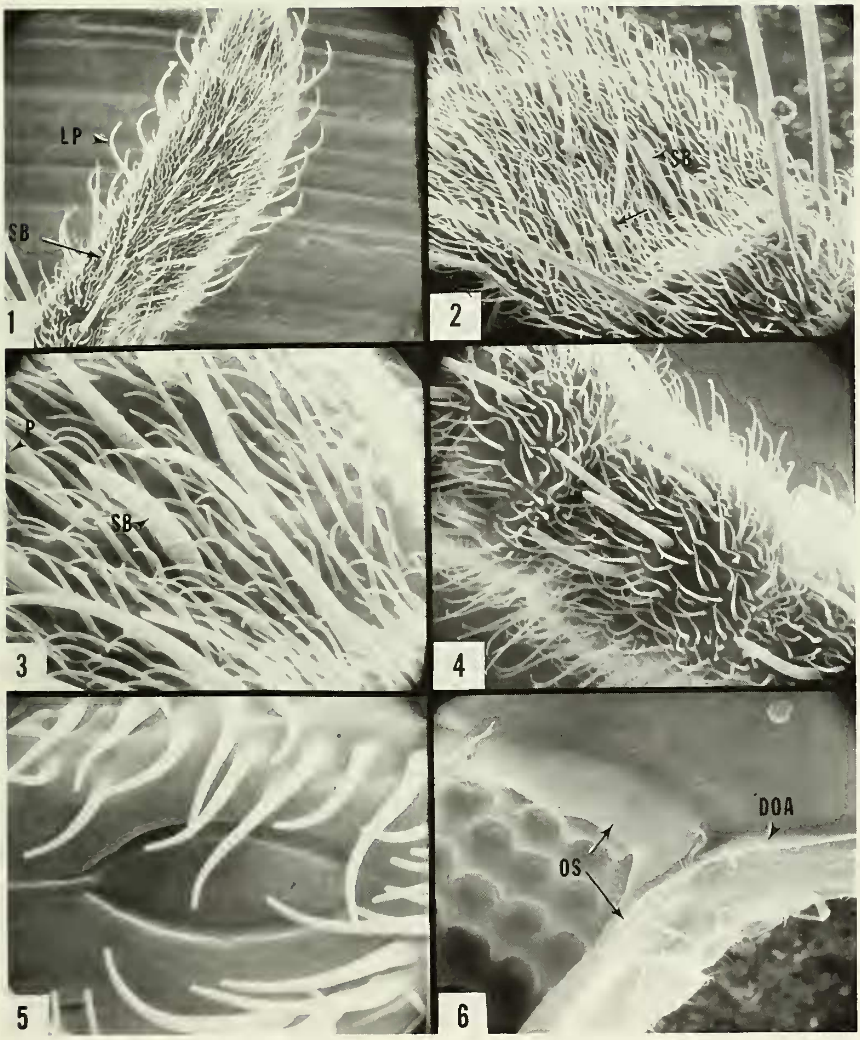
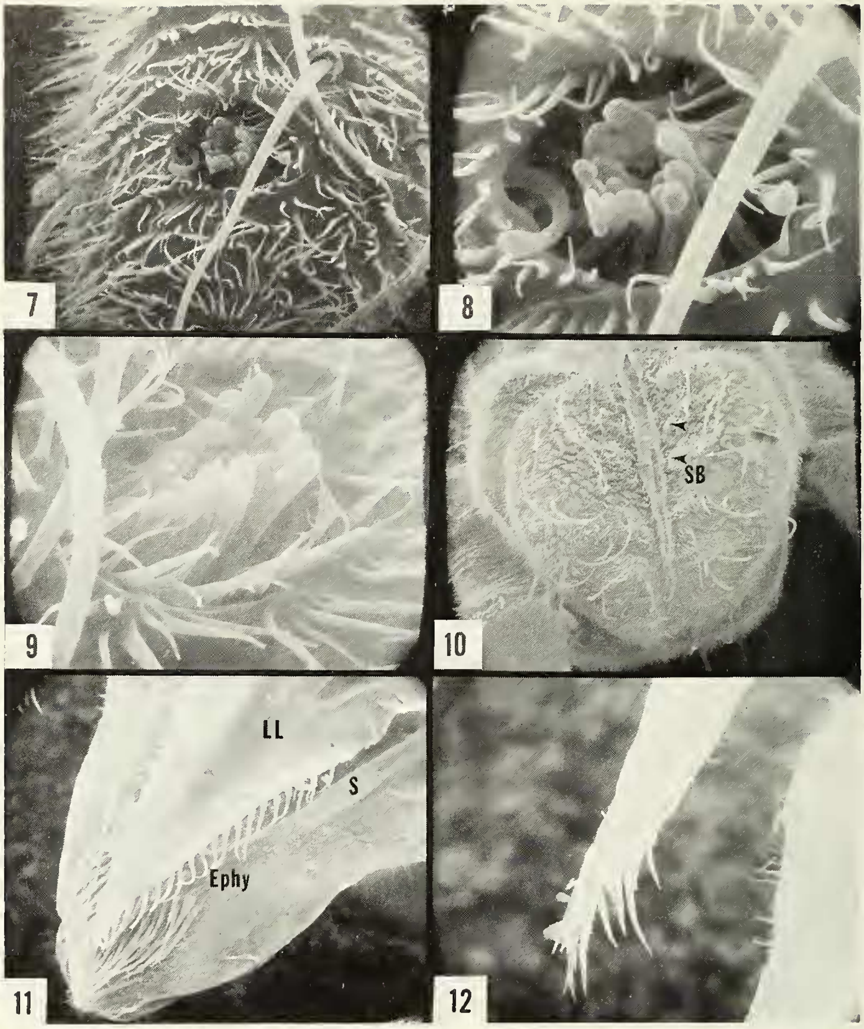
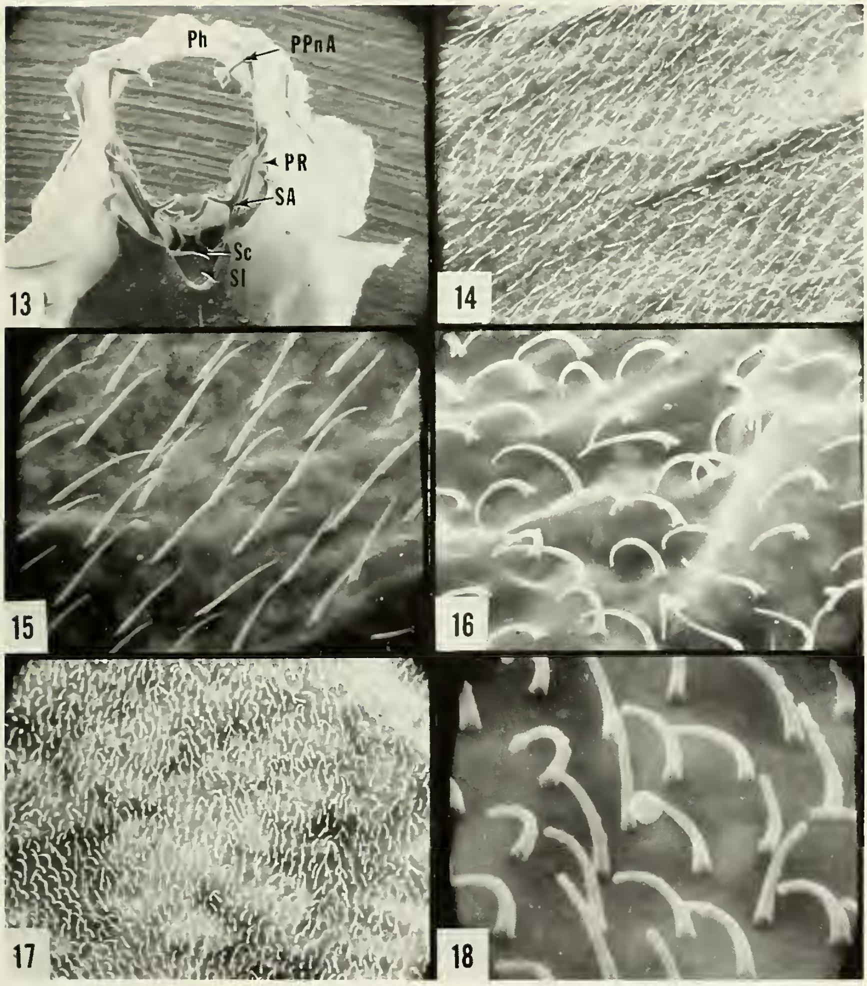
FIGS. 1-6. — Fig. 1. Ultimate flagellomere of *D. nivicavernicola,* 800×. Note the numerous long, pointed sensilla basiconica (LP) and the five short, blunt sensilla basiconica (SB); Fig. 2. Proximal end of ultimate flagellomere of *D. nivicavernicola,* 1,700×. Arrows point to two of at least five short, blunt sensilla basiconica (SB). Also note the large setal sockets and the ridged setae; Fig. 3. Portion of ultimate flagellomere of *D. nivicavernicola,* 4,500×. Note the numerous microtrichia, the several long, pointed sensilla basiconica, and the two short, blunt sensilla basiconica (SB). Also note the apparent presence of fine pores (P) on one of the short, blunt sensilla basiconica; Fig. 4. Flm_6 (dorsal view) and proximal region of Flm_7 of *D. nivicavernicola,* 2,000×. Note that the sensilla arise from small pits; Fig. 5. Sensillum on pedicel of *D. mendotae,* 9,000×; Fig. 6. Dorso-medial region of eye and adjacent vertex of *D. mendotae,* internal view, 1,050×. Note the internally-projecting ocular sclerite (OS) and the dorsal ocular apodeme (DOA).

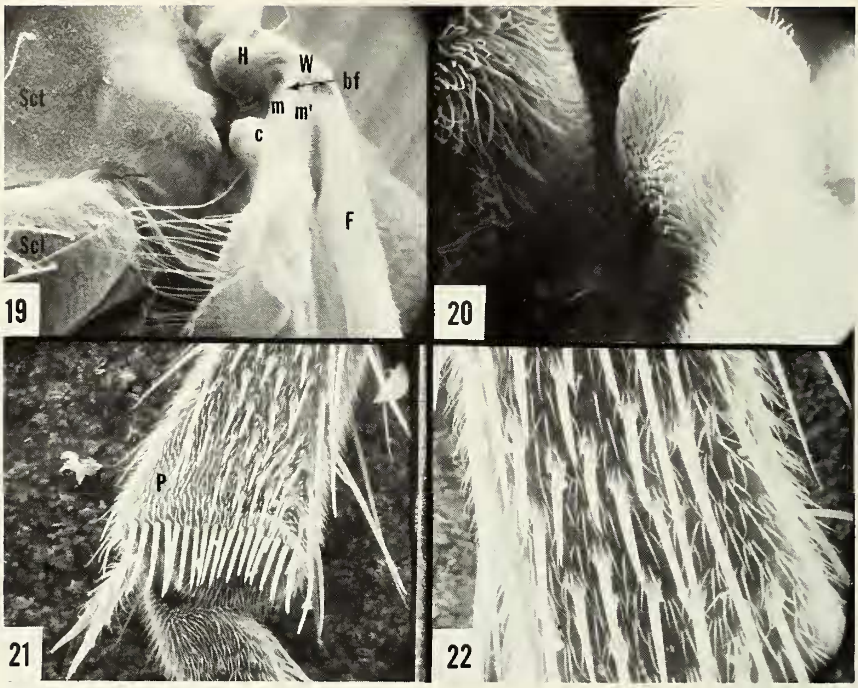

LP
SB
1
SB
2
P
SB
3
4
5
DOA
OS
6



FIGS. 7-12. — Fig. 7. Sunken organ on the third palpal segment of *D. mendotae,* 2,050×; Fig. 8. As above, but 5,100×; Fig. 9. As above; Fig. 10. Labella of *D. mendotae,* ventral view, 490×. Note the small sensilla basiconica (SB); Fig. 11. Postero-ventral view of labial lonchus (LL) and epipharynx (Ephy) of *D. mendotae,* 1,050×. The labella were removed to show these structures. Note the strengthening sclerite (S) on the posterior surface of the epipharynx (cf. Fig. 59) and the numerous seta-like spines; Fig. 12. Distal end of lacinia of *D. mendotae,* 2,100×.

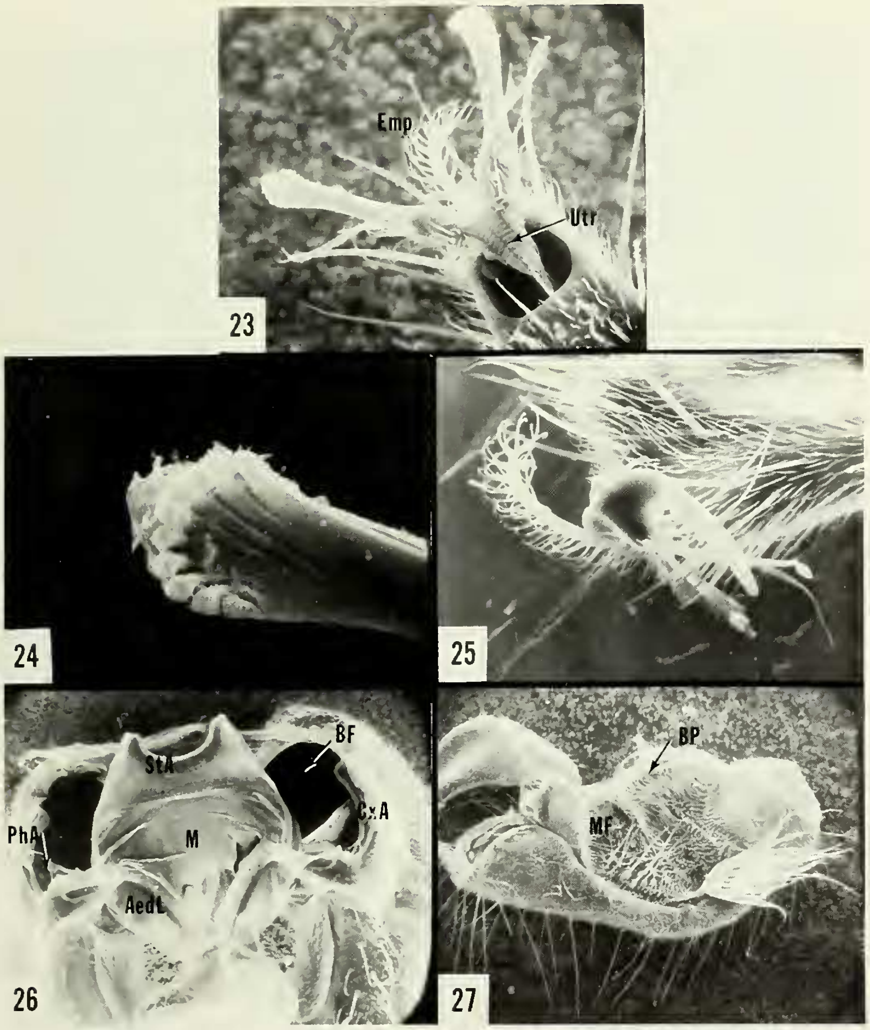


FIGS. 13-18. — Fig. 13. Internal view (looking anteriorly) of prothorax of *D. mendotae*, 90×. Phragma I (Ph) and the postpronotal apophyses (PPnA) are visible dorsally, while the sternal apophysis (SA) is seen to fuse with the pleural ridge (PR). The sternacosta (Sc) marks the fore margin of the sternellum (S1); Fig. 14. Microtrichia on wing membrane of *Boreoheptagyia lurida* (region photographed was between R_{4+5} and M_{1+2}), 600×. Note that the wing surface is slightly irregular, presumably giving the "punctured" appearance when the wing is viewed dry. Fig. 15. Same wing as above, 2,400×; Fig. 16. Wing microtrichia of *D. mendotae*, 5,500×; Fig. 17. Wing microtrichia of *Potthastia* sp., 2,100×; Fig. 18. As above, 21,000×. Note the different magnifications of Figs. 15, 16, and 18 needed to bring the microtrichia to approximately the same length.

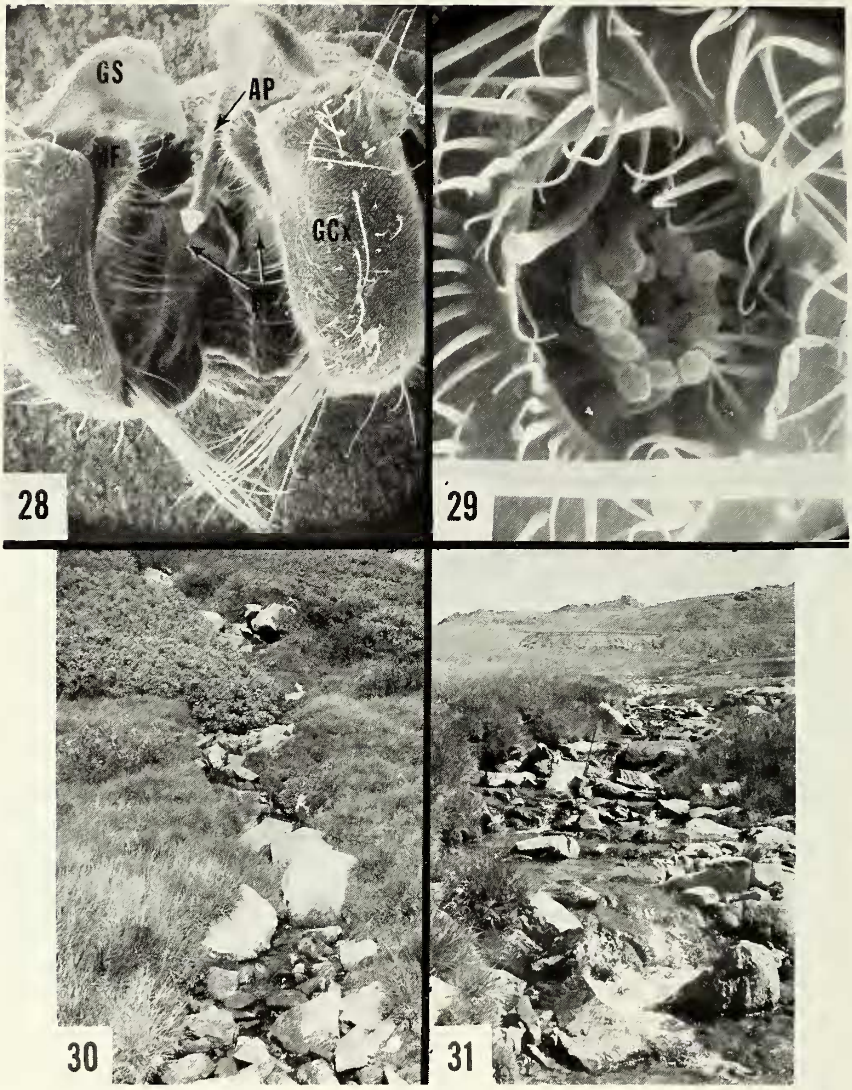


FIGS. 19-22. — Fig. 19. Wing base and adjacent thoracic region of *D. mendotae,* wing in rest position, 240×. Scl = scutellum. Note that the tip of the third axillary sclerite (c) contacts (here slightly removed from) a raised portion on the scutum (Sct) (cf. Fig. 89). Compare this photo with Snodgrass (1935), Fig. 113. The hand (H) of the remigium cups over projections of the first (cf. Figs. 89, 92) and second (cf. Figs. 89, 91) axillary sclerites (axillary sclerites not visible here). The remigium bends at its weak wrist (W), so the forearm (F) lies parallel to the body of the insect. "bf" is the *plica basalis* (Snodgrass, 1935: 238), the line of flexion between the proximal (m) and distal (m') medial plates. Also note the fine microtrichia on the scutum and scutellum; Fig. 20. Microtrichia-covered distal end of the third axillary sclerite ("c" above), 1,200×. Note that the hooked microtrichia lock with a group of similar microtrichia on the scutum when the two regions are appressed; Fig. 21. Posterior view of Ti III of *D. mendotae,* 500×. "P" marks the region of the polygon pattern visible in cleared material (cf. Fig. 109). Note the short, stout setae on the posterior surface of the tibia and the microtrichia on the tibial spurs; Fig. 22. Ti III of *D. mendotae,* about at mid-length, 1,000×. Note the ridged, short, stout setae and the grouped microtrichia.

FIGS. 23-27. — Fig. 23. Posttarsus of mid-leg of *D. mendotae,* 1,000×. Emp = empodium, Utr = unguitractor plate; Fig. 24. Tip of claw of above, 5,300×; Fig. 25. Claws and empodium of *D. nivicavernicola,* 870×. Note the lateral tooth; Fig. 26.



Bases of gonocoxites of *D. mendotae,* 220×. The gonocoxites have been removed from the body, and the ninth tergite, ninth sternite, and proctiger have also been removed. The coxapodeme (CxA) is the strong lateral rim of the basal foramen (BF). The two aedeagal lobes (AedL) of the intromittant organ articulate to the coxapodeme and the sternapodeme (StA), while the phallapodeme (PhA) projects into the cavity of the gonocoxite. Note the dorsal membrane (M) of the intromittant organ extending from the aedeagal lobes to the sternapodeme; Fig. 27. Medial view of left gonocoxite of *D. mendotae,* 210×. Note the basimedial setal cluster, the basal plate (BP) with microtrichia on its ventral surface, and the free distal end of the medial field (MF).

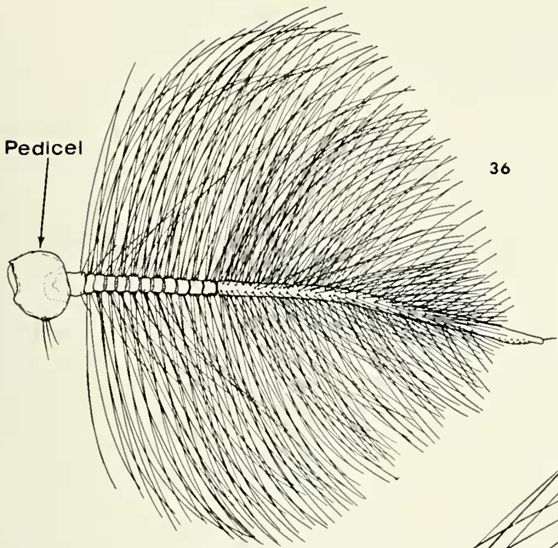


Figs. 28-31. — Fig. 28. Posterior view of hypopygium of *D. mendotae,* 210×. GS = gonostylus, Gcx = gonocoxite, AP = anal point, BP = basal plate, MF = medial field (here the free end of it); Fig. 29. Sunken organ on the third palpal segment of *D. mendotae,* 4,600×; Fig. 30. Small, steep stream feeding Frozen Lake, Bear Tooth Mountains, Wyoming, alt. 10,300′. *D. leoniella* adults were found on the rocks above the splash line, and a male pupa of *D. chorea,* with the cast larval skin, was collected in a silk and sand case from a rock. Note drift trap at center;

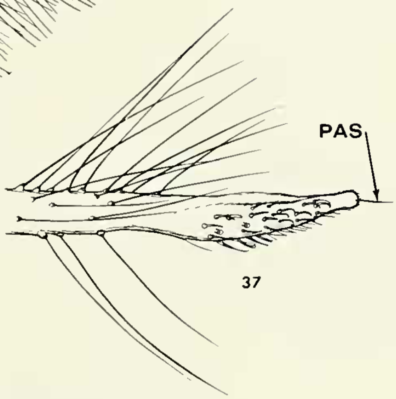
FIGS. 32-35. — Fig. 32. Stream feeding unnamed lake, Bear Tooth Mountains, Wyoming, alt. 9,640′, 44°58′26″N, 109°33′12″W; water temp. 14°C (early afternoon). *D. leoniella* adults were common just above splash line on rocks; larvae and pupae of *leoniella* were found on the rock surface where the water ran in a shallow sheet. Drift trap at lower right; Fig. 33. Bridge across South Arkansas River, Colorado, Dec. 11, 1968. Adults of *D. heteropus* and *spinacies* were swept from under the bridge, where they had been resting on the beams. Adults of *D. leona* were taken in a similar stream by turning over the ledge ice and looking in the honeycombed ice; Fig. 34. Arkansas River, 6 mi. NW of Salida, Colorado, Dec. 11, 1968. Adults of *D. leona* were taken from a cluster of rocks in mid-stream (see Fig. 35); Fig. 35. As above. Adults of *D. leona* were found on the rocks or under the small pieces of ice.

Fig. 31. Small, rocky stream feeding Frozen Lake, Bear Tooth Mountains, Wyoming, alt. 10,300′. Pupae or pupal exuviae of *D. chorea, garretti, heteropus,* and *spinacies* were taken from this stream. Drift trap at upper left center.

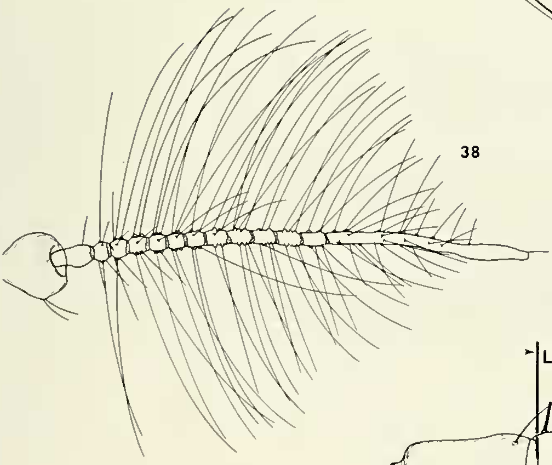
FIGS. 36-39. — Fig. 36. Plumose antenna of *D. mendotae;* Fig. 37. Spindle-shaped apex of Flm_{13} of *D. mendotae.* PAS = preapical antennal seta; Fig. 38. Antenna of *D. cinerella;* Fig. 39. Proximal three flagellomeres of antenna of *D. mendotae.*



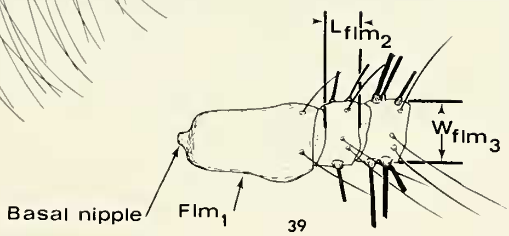
36



37

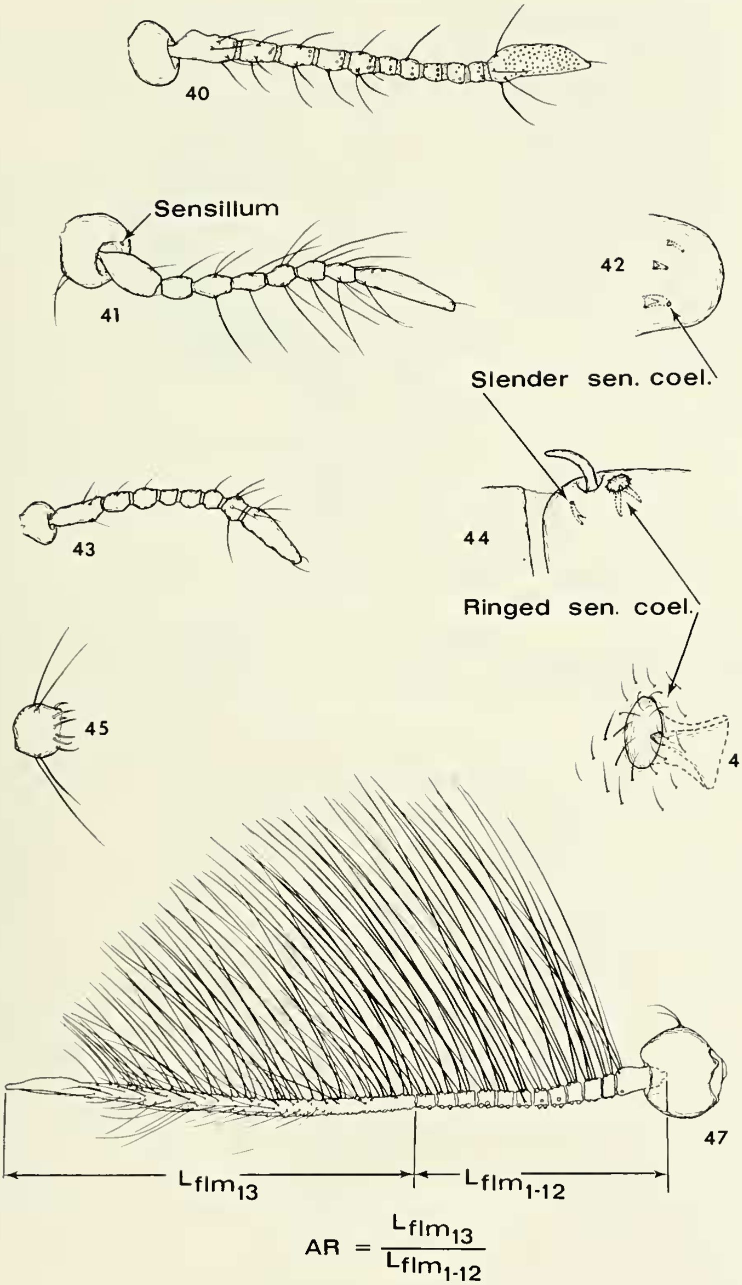


38

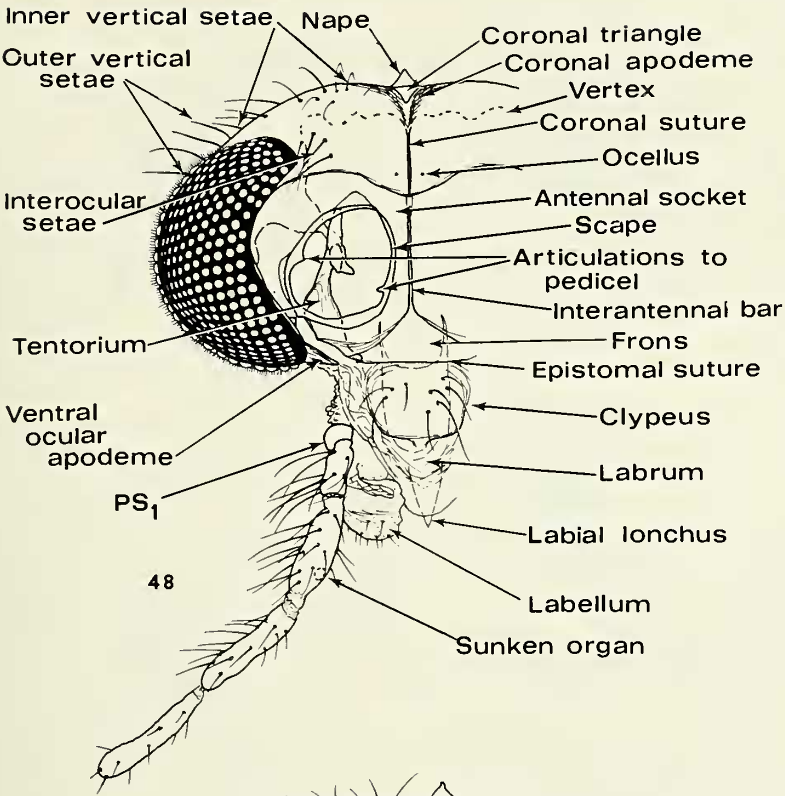


39

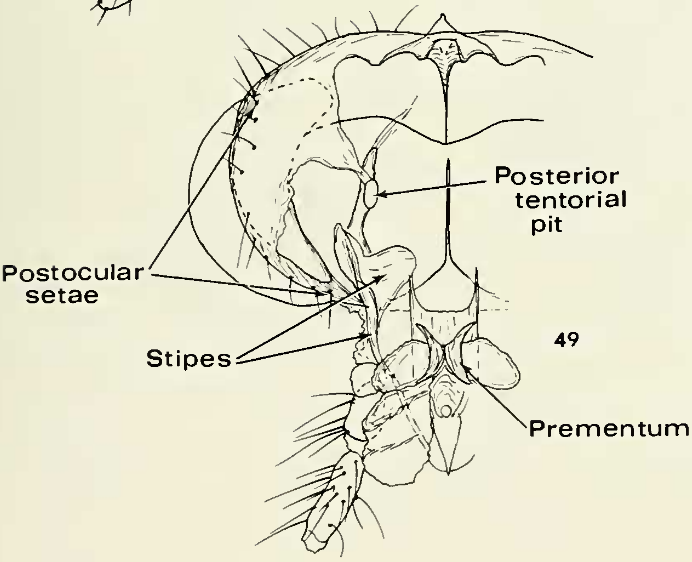
Figs. 40-47. — Fig. 40. Antenna of *D. nivicavernicola.* Small circles show locations of the sensilla basiconica; Fig. 41. Antenna of *D. coquilletti;* Fig. 42. Small sensilla coeloconica at apex of antenna; Fig. 43. Antenna of *D. amplexivirilia.* Fig. 44. Sensilla at distal end of Flm_1 of *D. coquilletti;* Fig. 45. Flm_7 of *D. amplexivirilia* showing the long, pointed sensilla basiconica; Fig. 46. Ringed sensillum coeloconicum; Fig. 47. Diagramatic antenna, showing AR.


40
Sensillum
41
42
Slender sen. coel.
43
44
Ringed sen. coel.
45
46
47
$L_{flm_{13}}$
$L_{flm_{1-12}}$
$AR = \frac{L_{flm_{13}}}{L_{flm_{1-12}}}$

FIGS. 48-49. — Fig. 48. Head of *D. mendotae;* Fig. 49. Head of *D. mendotae,* posterior view.

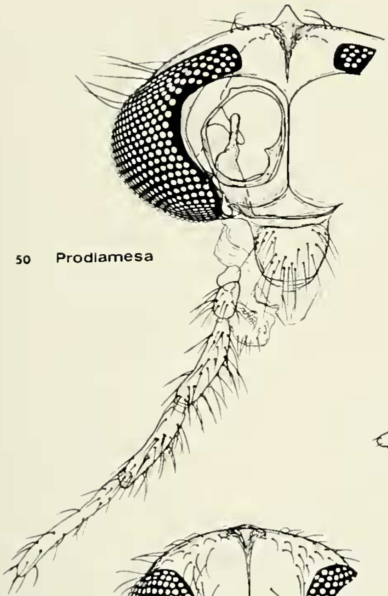

Inner vertical setae
Nape
Coronal triangle
Coronal apodeme
Outer vertical setae
Vertex
Coronal suture
Ocellus
Interocular setae
Antennal socket
Scape
Articulations to pedicel
Interantennal bar
Tentorium
Frons
Epistomal suture
Ventral ocular apodeme
Clypeus
Labrum
PS_1
Labial lonchus
Labellum
Sunken organ

48

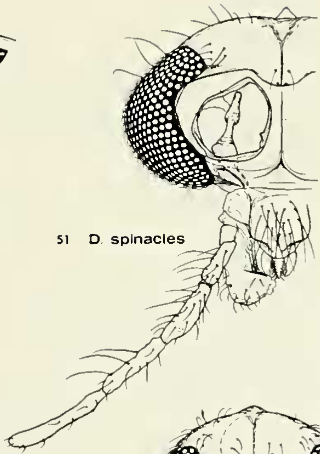

Posterior tentorial pit
Postocular setae
Stipes
Prementum

49

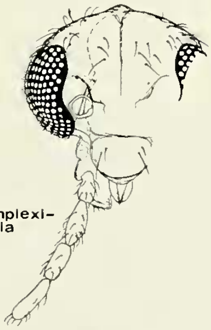
Figs. 50-55. — Self-explanatory.



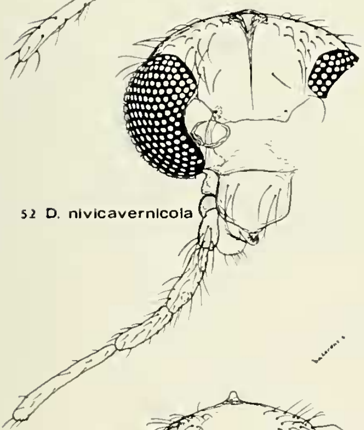
50 Prodiamesa



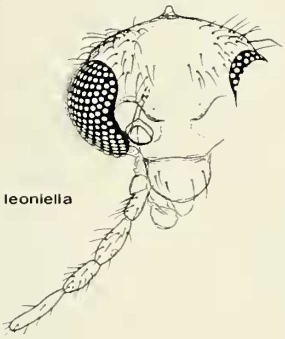
51 D. spinacies



53 D. amplexi-
virilia



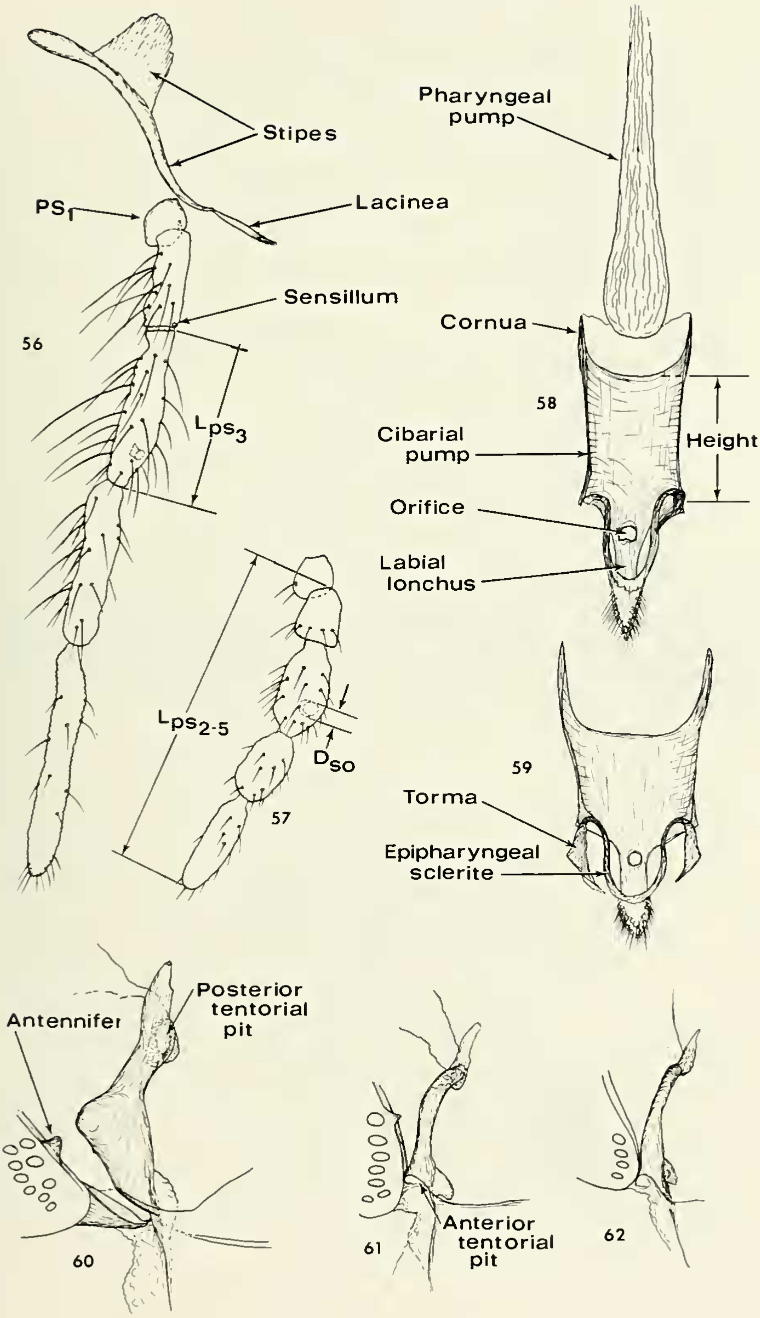
52 D. nivicavernicola



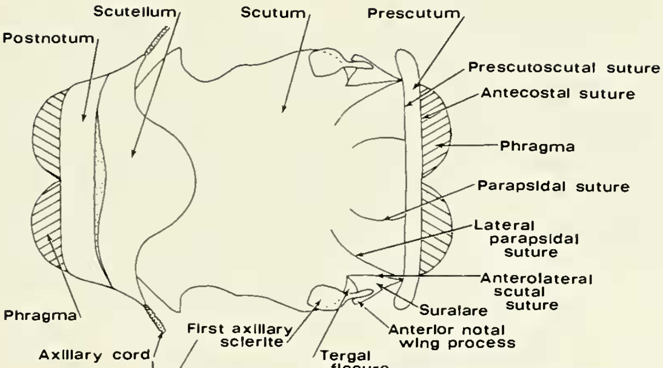
54 D. leoniella

55 D. leona

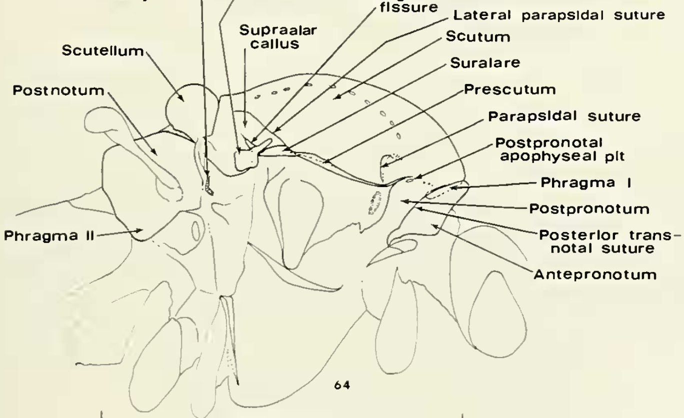
FIGS. 56-62. — Fig. 56. Maxilla of *D. mendotae.* Note the small first palpal segment (PS_1) articulating to the stipes; Fig. 57. Palpus of *D. leona;* Fig. 58. Cibarial pump, etc. of *D. mendotae.* The height is measured from the articulation of the torma to the center of the concave dorsal margin; Fig. 59. Cibarial pump, etc., of *D. leona.* The sclerite on the epipharynx (cf. Fig. 11) forms a "U" running between the articulations of the tormae to the cibarial pump; Fig. 60. Tentorium and ventral region of eye of *D. mendotae.* Note the strong ventral ocular apodeme (cf. Fig. 48); Fig. 61. Tentorium and ventral region of eye of *D. nivicavernicola.* Note the absence of a ventral ocular apodeme; Fig. 62. Tentorium and ventral region of eye of *D. davisi.*


Stipes
Lacinea
PS_1
Sensillum
56
L_{ps_3}
$L_{ps_{2\text{-}5}}$
D_{so}
57
Pharyngeal pump
Cornua
58
Cibarial pump
Height
Orifice
Labial lonchus
59
Torma
Epipharyngeal sclerite
Antennifer
Posterior tentorial pit
60
61
Anterior tentorial pit
62

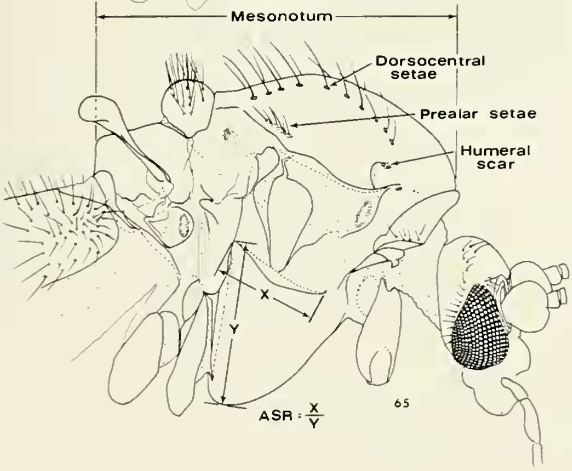
FIGS. 63-65. — Fig. 63. Primitive or hypothetical notum, modified slightly from Snodgrass, 1935, and Matsuda, 1970: Fig. 3. Some sutures were omitted for clarity; Fig. 64. Pro- and mesonotal regions of *D. mendotae*. Parts of metathorax and various sclerites at base of wing omitted; Fig. 65. Thorax of *D. mendotae*. ARS = anapleural suture ratio.


Scutellum
Scutum
Prescutum
Postnotum
Prescutoscutal suture
Antecostal suture
Phragma
Parapsidal suture
Lateral parapsidal suture
Anterolateral scutal suture
Suralare
Phragma
Anterior notal wing process
First axillary sclerite
Axillary cord
Tergal fissure

63

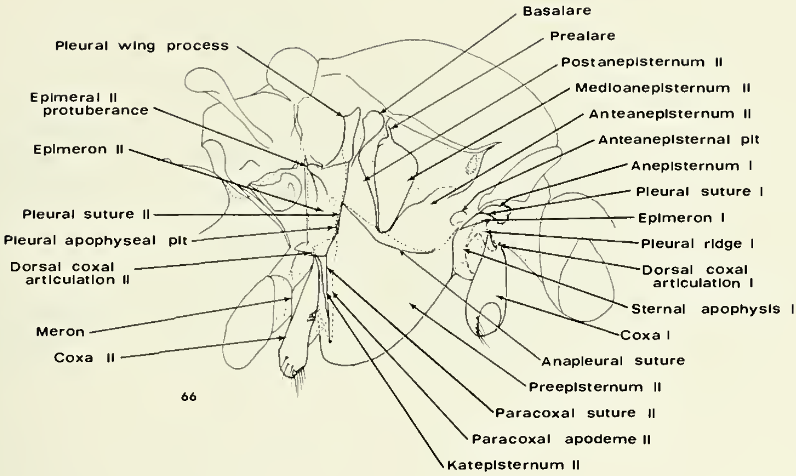

Lateral parapsidal suture
Supraalar callus
Scutum
Scutellum
Suralare
Postnotum
Prescutum
Parapsidal suture
Postpronotal apophyseal pit
Phragma I
Postpronotum
Phragma II
Posterior trans-notal suture
Antepronotum

64

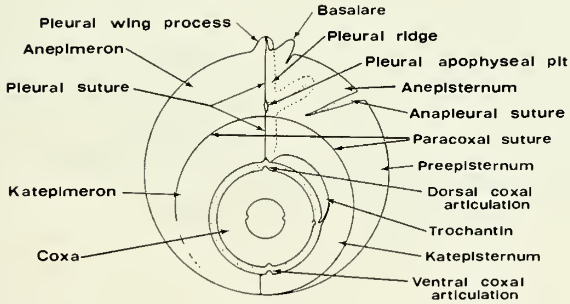

Mesonotum
Dorsocentral setae
Prealar setae
Humeral scar
X
Y
ASR = X/Y

65

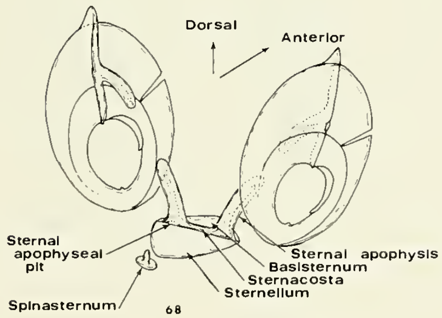
FIGS. 66-68. — Fig. 66. Pleural regions of pro- and mesothorax of *D. mendotae;* Fig. 67. Primitive pleuron, modified from Matsuda, 1970: Fig. 14; Fig. 68. The two primitive pleural regions and the primitive sternal sclerites in a pterothoracic segment, viewed posterolaterally.



66

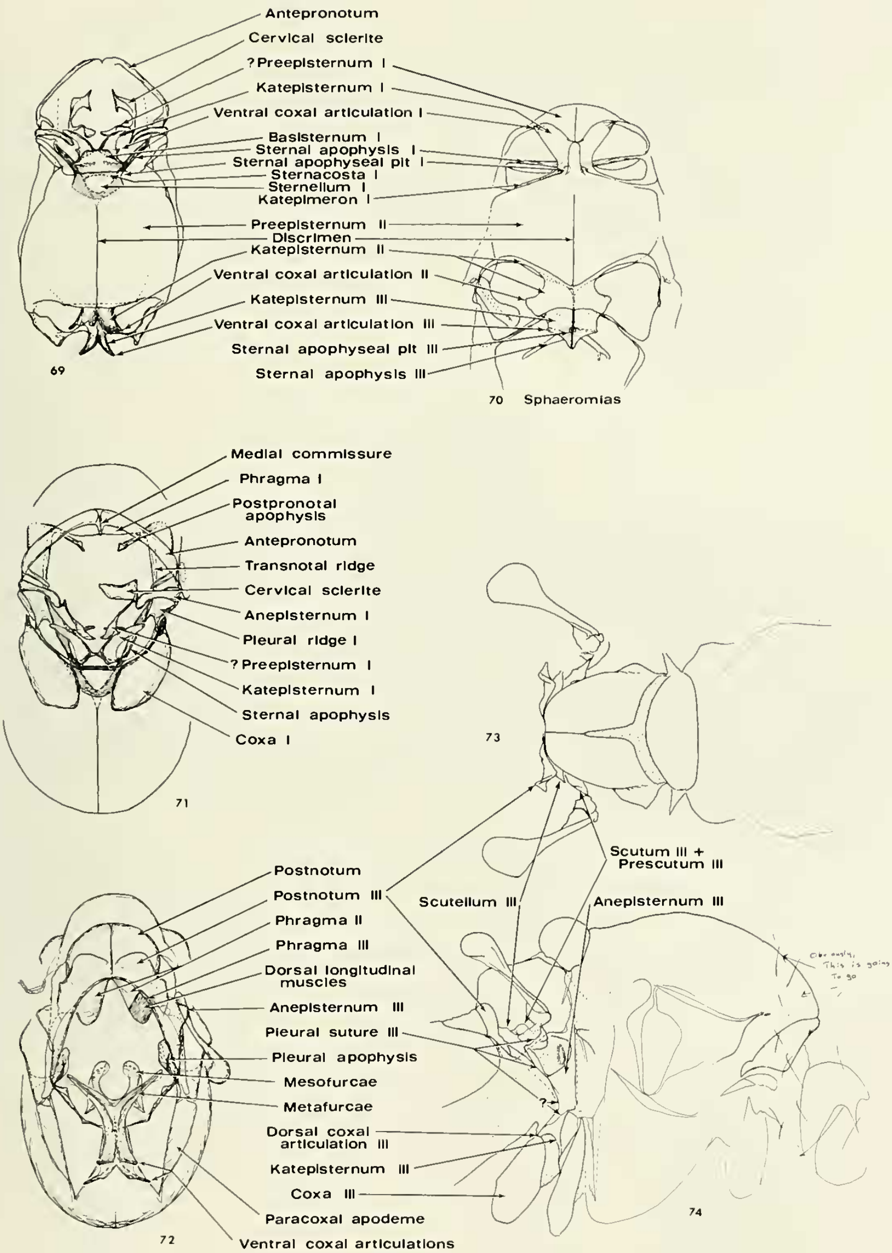


67 Primitive pleuron Anterior →

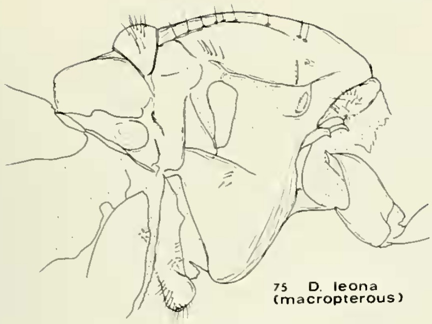


68

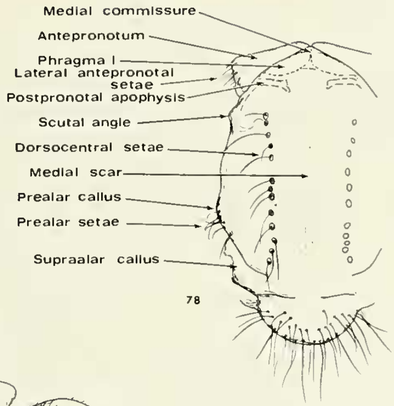
FIGS. 69-74. — Fig. 69. Ventral view of thorax of *D. mendotae.* The sternal apophyseal pit I is more readily visible from a ventro-lateral view. No sternal apophyseal pits are visible in the meso- and metathorax; Fig. 70. Ventral view of thorax of *Sphaeromias* (Ceratopogonidae). This is an interesting thorax. The strong anterior-most sclerite is probably preepisternum I. The sternal apophyseal pits are readily visible in both the pro- and metathorax. Note that katepisternum II is continuous anteriorly from the dorsal to the ventral coxal articulation and that there is a slender katepimeron I; Fig. 71. Antero-ventral view of thorax of *D. mendotae;* Fig. 72. Posterior view of thorax of *D. mendotae.* Note the internal furcae; Fig. 73. *D. mendotae;* Fig. 74. *D. mendotae.*


Antepronotum
Cervical sclerite
?Preepisternum I
Katepisternum I
Ventral coxal articulation I
Basisternum I
Sternal apophysis I
Sternal apophyseal pit I
Sternacosta I
Sternellum I
Katepimeron I
Preepisternum II
Discrimen
Katepisternum II
Ventral coxal articulation II
Katepisternum III
Ventral coxal articulation III
Sternal apophyseal pit III
Sternal apophysis III
69
70 Sphaeromias
Medial commissure
Phragma I
Postpronotal apophysis
Antepronotum
Transnotal ridge
Cervical sclerite
Anepisternum I
Pleural ridge I
?Preepisternum I
Katepisternum I
Sternal apophysis
Coxa I
71
73
Scutum III + Prescutum III
Postnotum
Postnotum III
Scutellum III
Anepisternum III
Phragma II
Phragma III
Dorsal longitudinal muscles
Anepisternum III
Pleural suture III
Pleural apophysis
Mesofurcae
Metafurcae
Dorsal coxal articulation III
Katepisternum III
Coxa III
Paracoxal apodeme
Ventral coxal articulations
72
74

FIGS. 75-88. — Figs. 75-77. Self-explanatory. Note, however, the flattening of the scutum and scutellum and the rounded postero-dorsal border of the postnotum in the brachypterous *D. leona.* Also note the reduction in preepisternum II, the shortened anapleural suture, and the short setae just below the anapleural suture; Fig. 78. Portion of dorsum of thorax of *D. mendotae.* Figs. 79-82. Variation in arrangement of DCS in four specimens of *D. mendotae;* Figs. 83-85. Variation in shape of antepronotal notch in three specimens of *D. mendotae;* Fig. 86. Portion of dorsum of thorax of *D. leoniella.* Note "gaping" antepronotal notch; Fig. 87. Portion of dorsum of thorax of *D. leona,* macropterous form. The antepronotal notch is membranous medially; Fig. 88. As above, but brachypterous form. The antepronotal halves fuse medially.



75 D. leona (macropterous)



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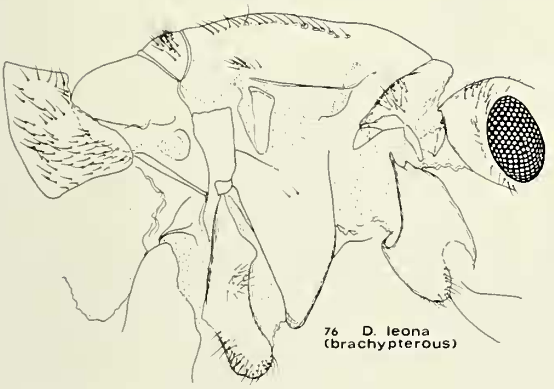
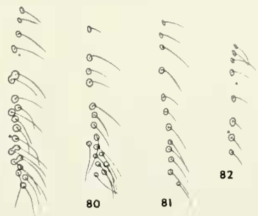
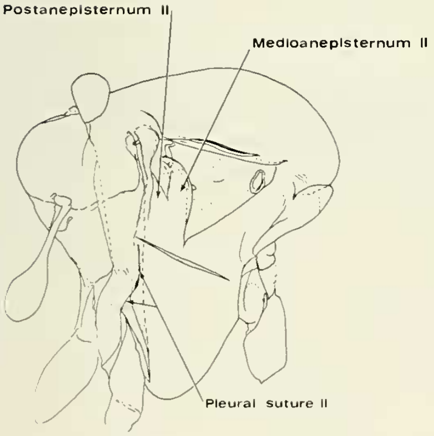


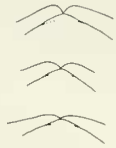
76 D. leona (brachypterous)



79 80 81 82



77 Lasiodiamesa



83 84 85

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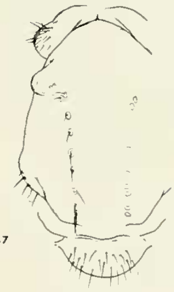
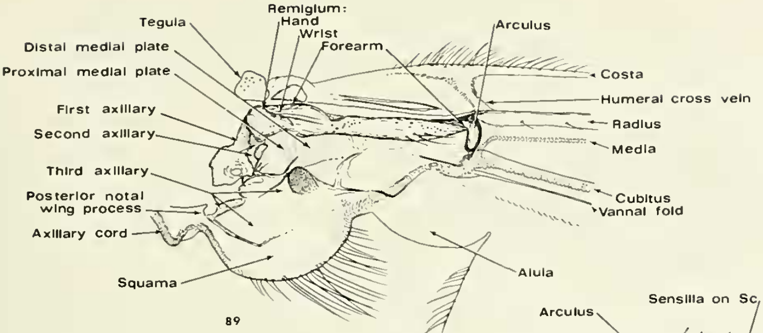


87

88

FIGS. 89-97. — Fig. 89. Base of wing of *D. mendotae;* Fig. 90. Distal end of remigium, arculus, etc., *D. mendotae.* The arrow heads point to the three anterior and one posterior large sensilla. The sensilla on Sc are on the ventral surface of the vein; Fig. 91. Junction of wing and mesothorax, *D. mendotae,* lateral view; Fig. 92. Details of first axillary sclerite of *D. mendotae;* Fig. 93. Wing of *D. mendotae;* Fig. 94-97. Series of hypothetical wings showing r-m moving proximally and R_4, R_5, and M_2 weakening and becoming nothing but vestiges.



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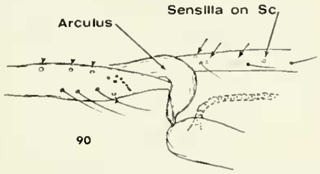

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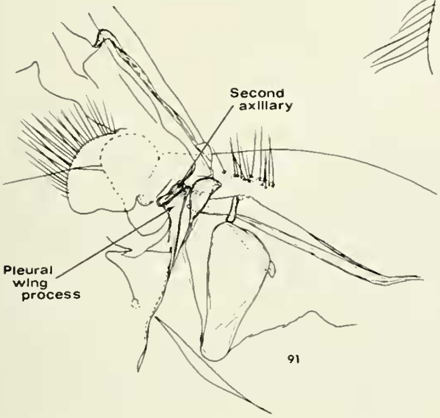

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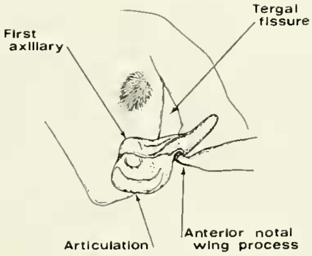

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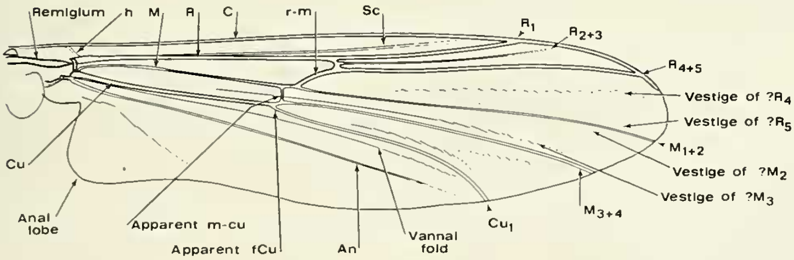

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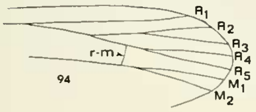

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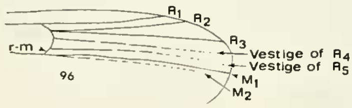

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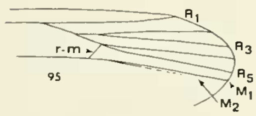

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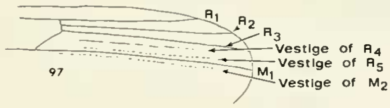
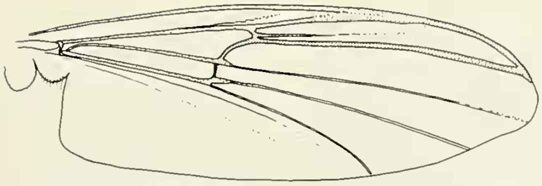
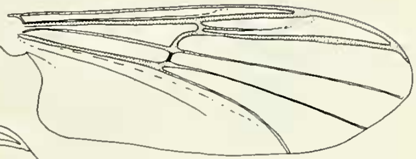


97

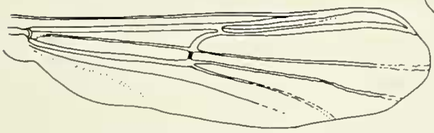
FIGS. 98-109. — Fig. 98. *D. nivicavernicola.* Note how the distal end of R_1 broadens and diffusely fuses with the costa; Figs. 99-101. Wings of *D. leona,* all to the same scale; Figs. 102-104. Self-explanatory; Fig. 105. Fore tibia of *D. haydaki,* showing slender apical spur with very sparse prickles and small basal sensillum; Fig. 106. Fore tibia of *D. leona.* Note that the apical spur is shortened and thickened, that the numerous prickles cover most of the spur, and that the sensillum is more distal than in Fig. 105; Fig. 107. Mid tibia of *D. leona,* showing one of the two apical spurs. Note extreme thickening of spur and the dense covering of prickles; Fig. 108. Spiniform setae on Tm_3 of P III of *D. haydaki.* Note how the spiniform setae are arranged more-or-less in pairs in two rows; Fig. 109. Apex of Ti III, showing short, stout setae on posterior surface, the polygon pattern, and the posterior comb.



98 D. nivicavernicola ♀

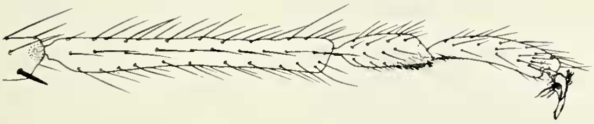


99 D. leona



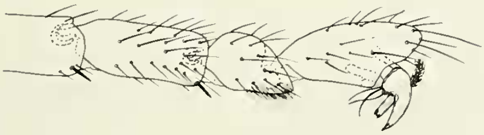
100 D. leona

101 D. leona



102 P I, D. mendotae

103 P I, D. leona



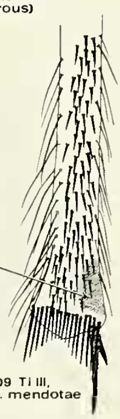
104 P II D. leona (brachypterous)

105 Ti I, D. haydaki

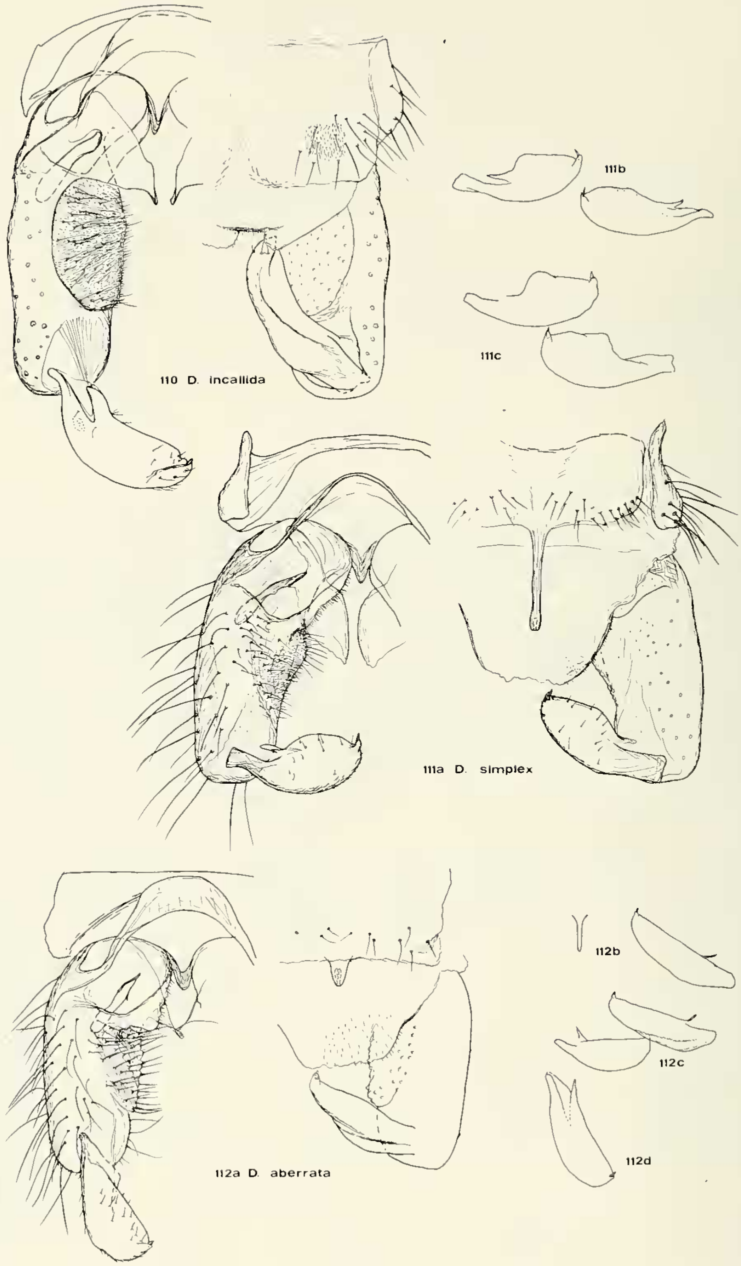
106 Ti I, D. leona

107 Ti II, D. leona

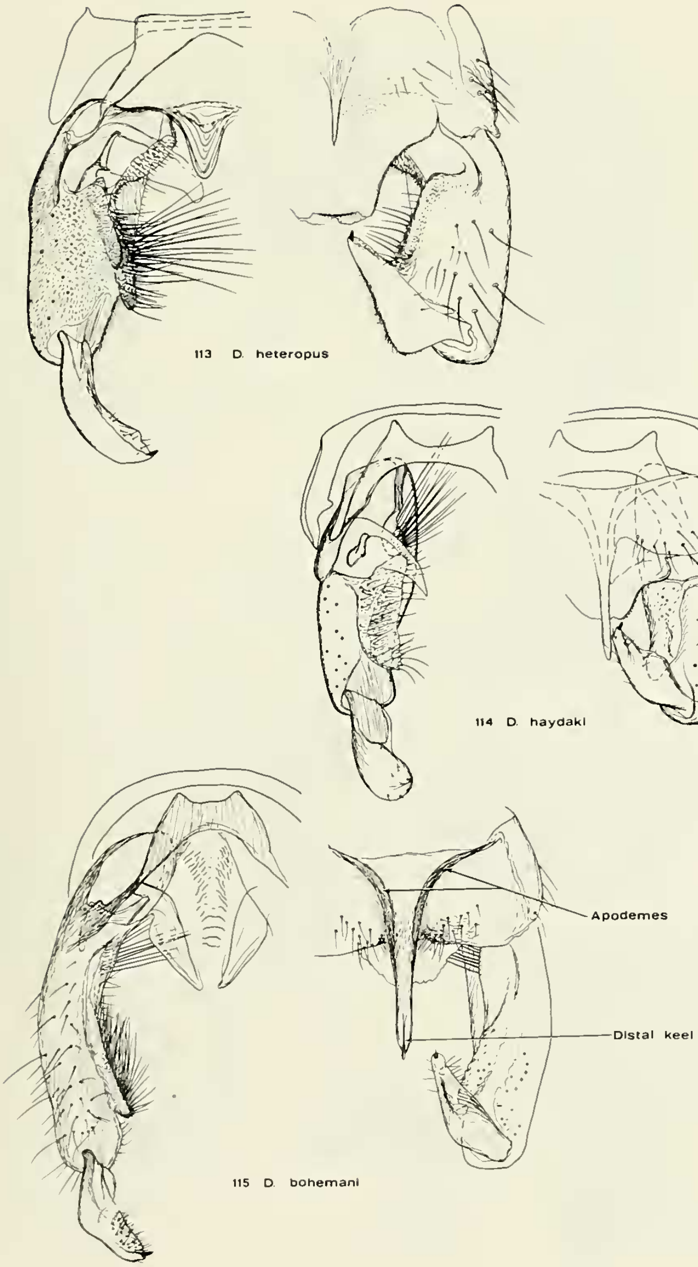
108 Tm_3



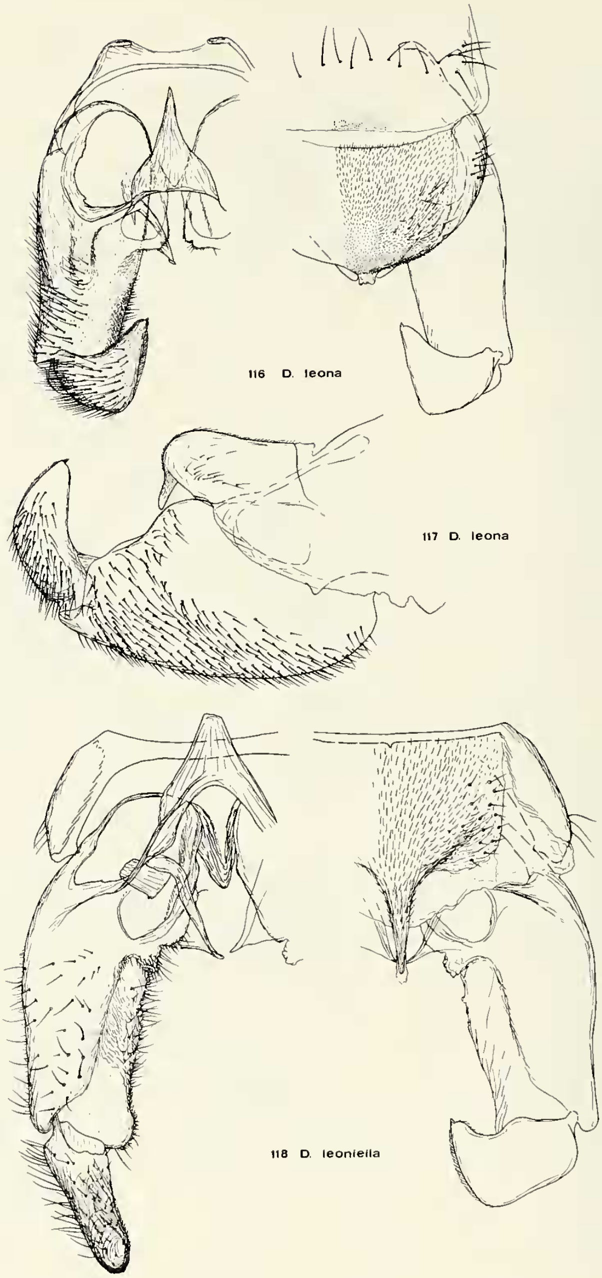
109 Ti III, D. mendotae



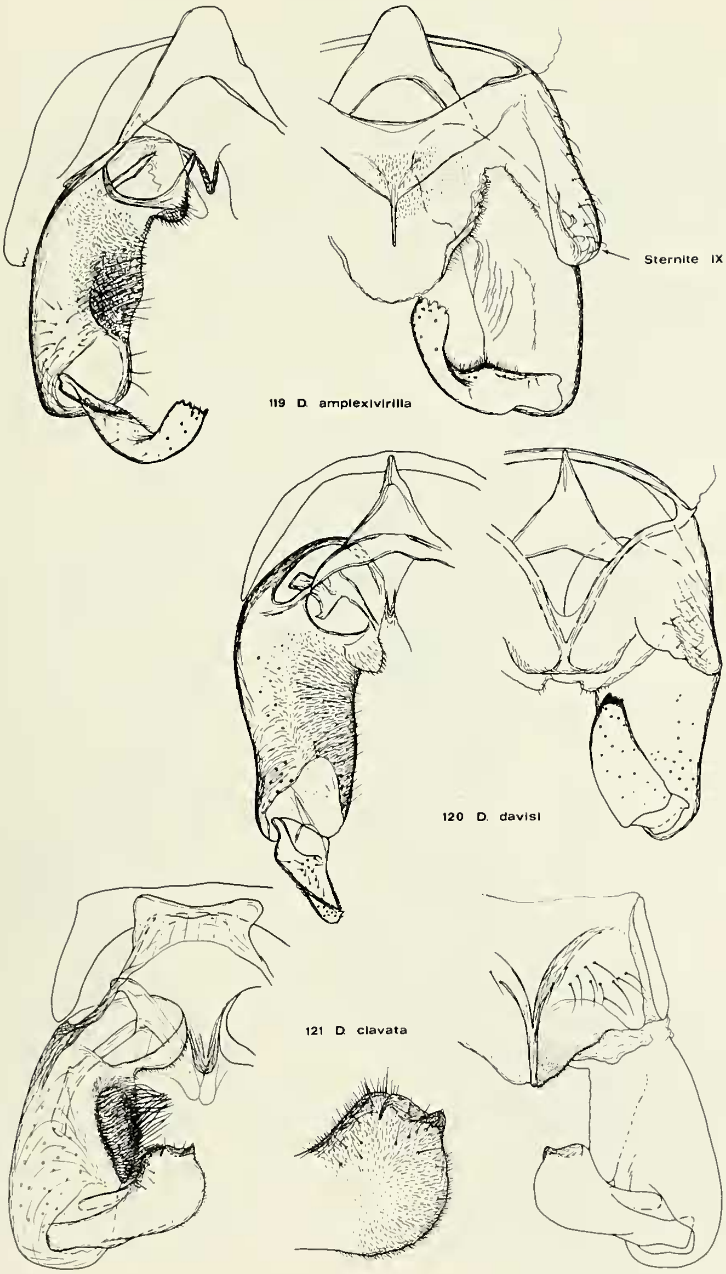
FIGS. 110-112. — Male hypopygia.



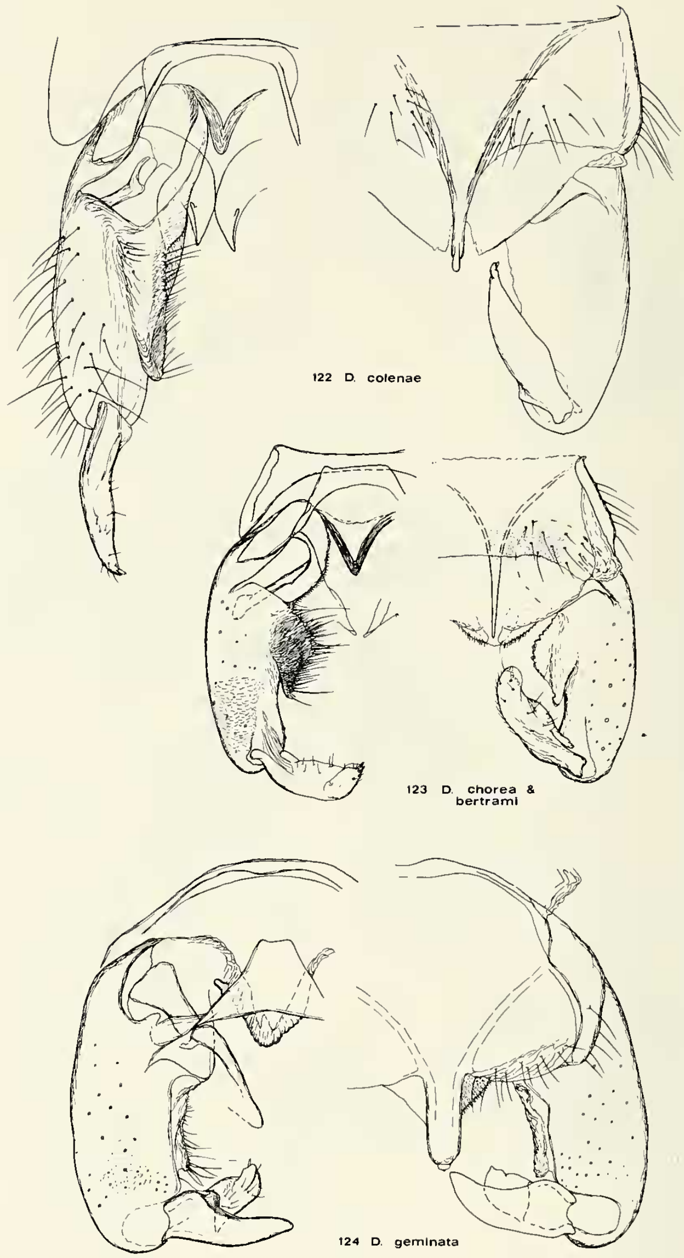
FIGS. 113-115. — Male hypopygia.



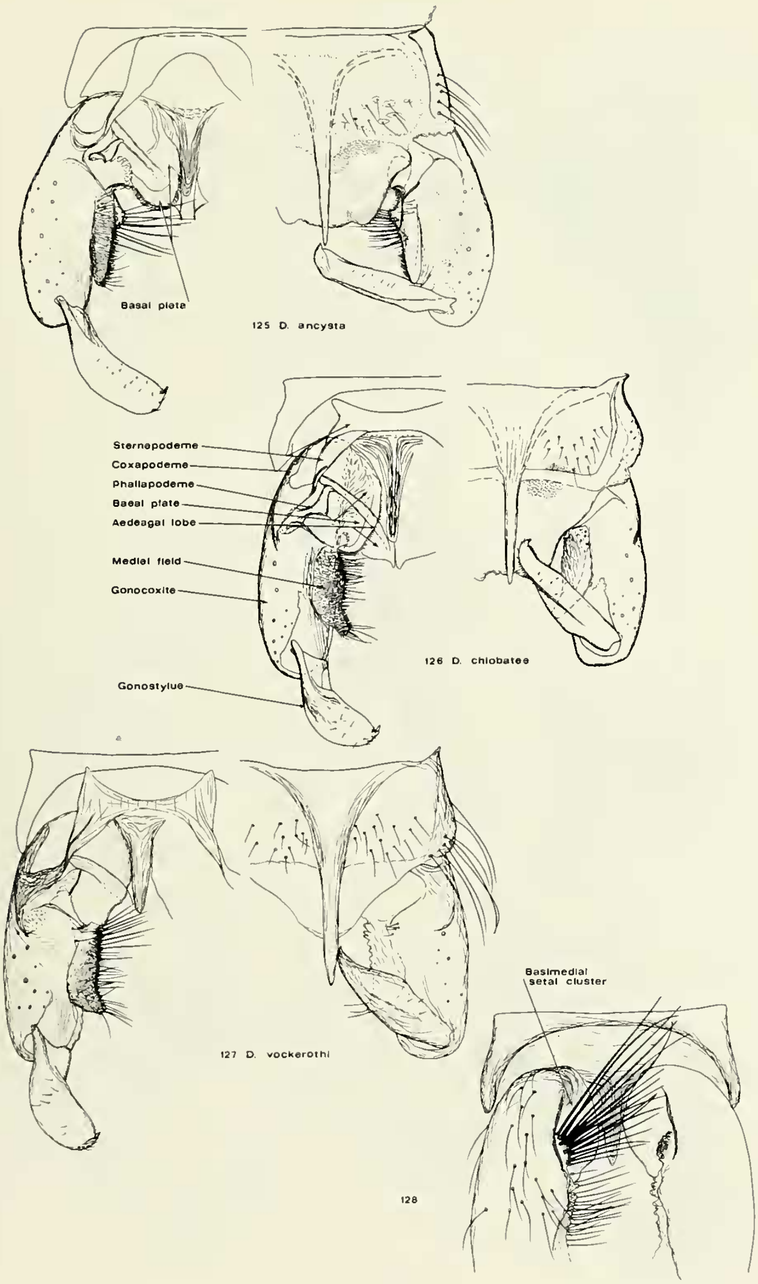
Figs. 116-118. — Male hypopygia.



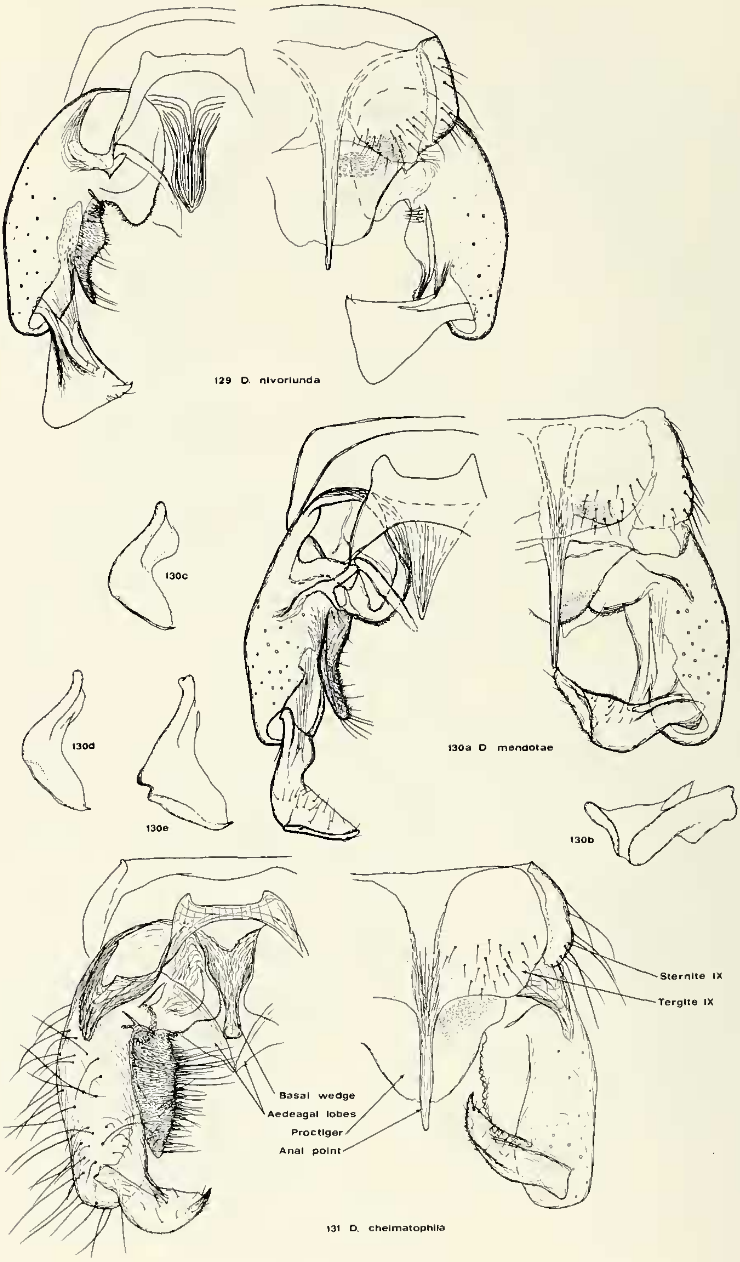
FIGS. 119-121. — Male hypopygia.



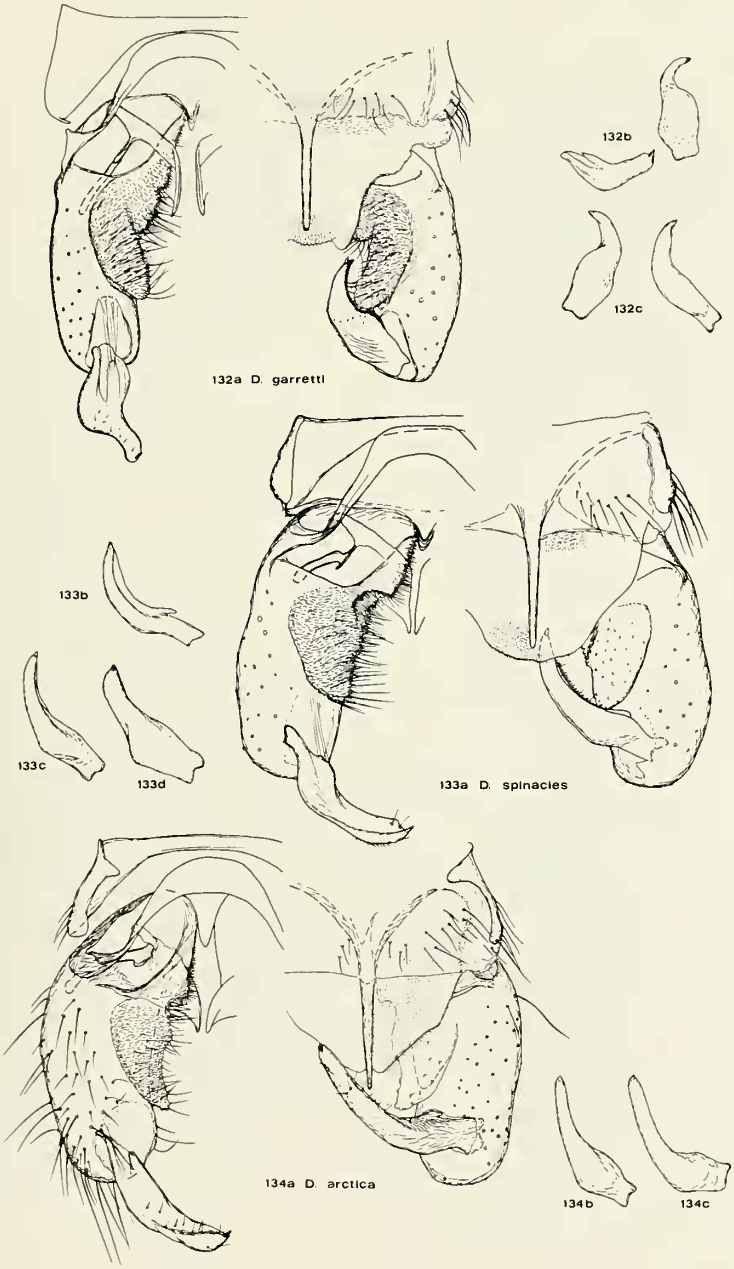
FIGS. 122-124. — Male hypopygia.



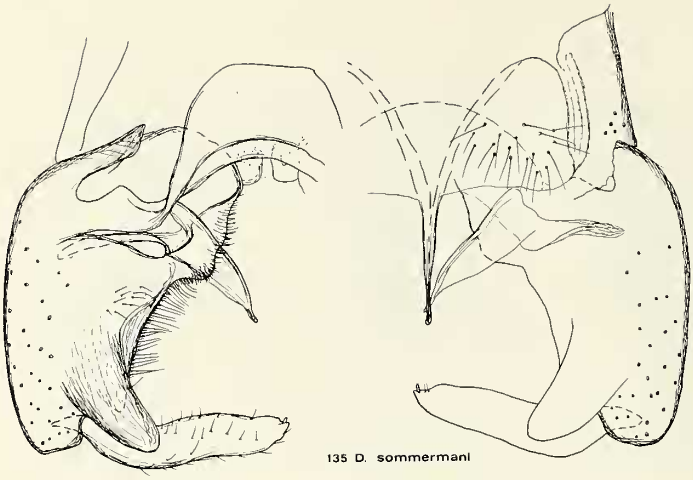
FIGS. 125-128. — Male hypopygia.



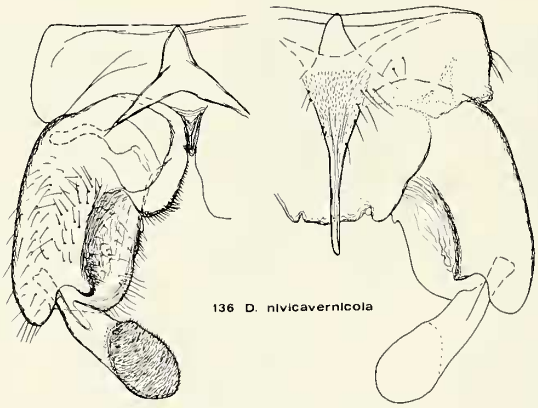
FIGS. 129-131. — Male hypopygia.



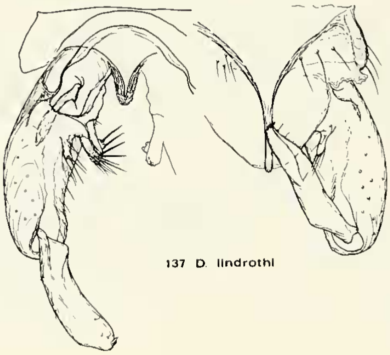
FIGS. 132-134. — Male hypopygia.



135 D. sommermani

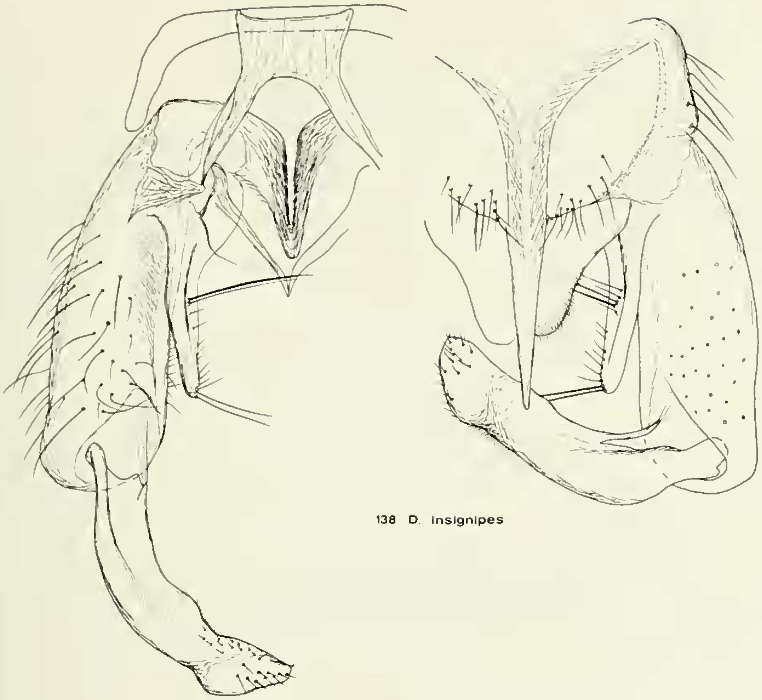


136 D. nivicavernicola

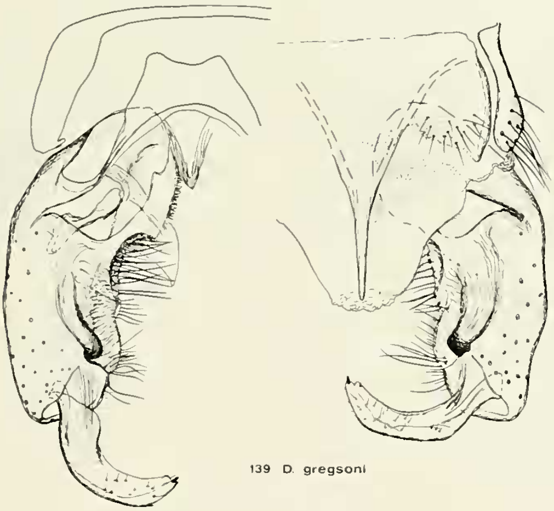


137 D. lindrothi

Figs. 135-137. — Male hypopygia.



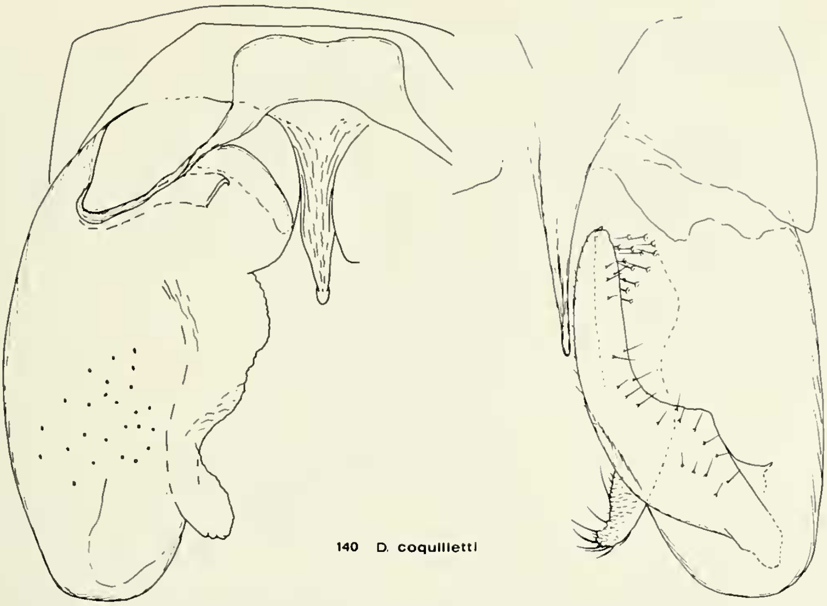
138 D. insignipes



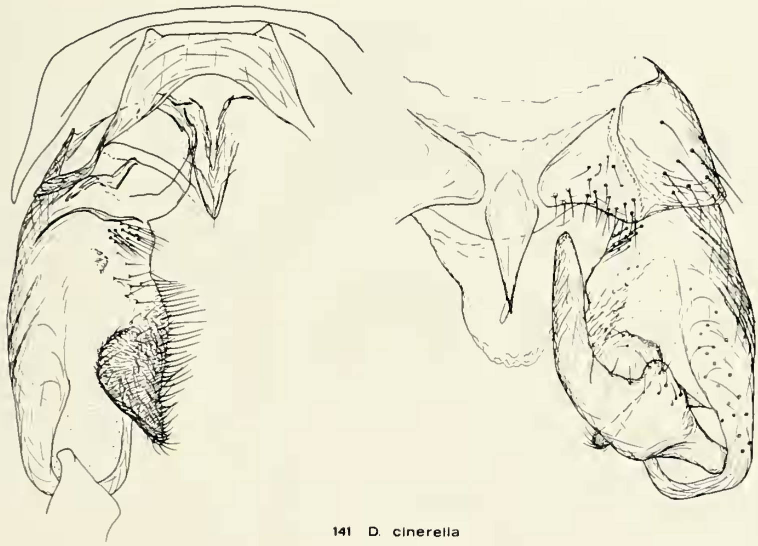
139 D. gregsoni

FIGS. 138-139. — Male hypopygia.

FIGS. 140-141. — Male hypopygia.

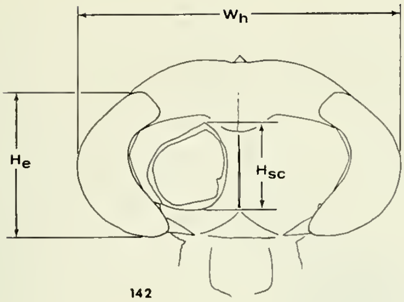


140 D. coquilletti



141 D. cinerella

FIGS. 142-147. — Figs. 142-144. Self-explanatory; Fig. 145. Costal projection beyond R_{4+5}; expressed numerically by dividing the length (L in figure) by the width of the vein; Fig. 146, 147. Explanation of LR, BV, and SV. In Fig. 147, LR would be lower, and BV and SV would be higher, than in Fig. 146.



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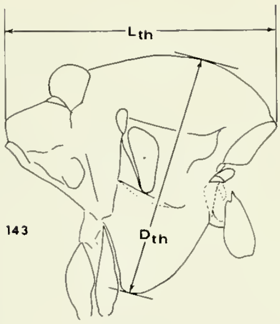

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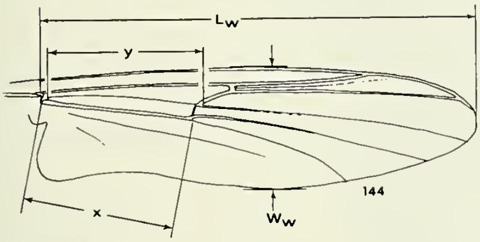
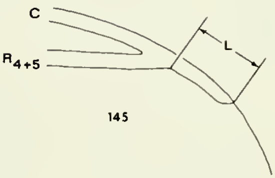
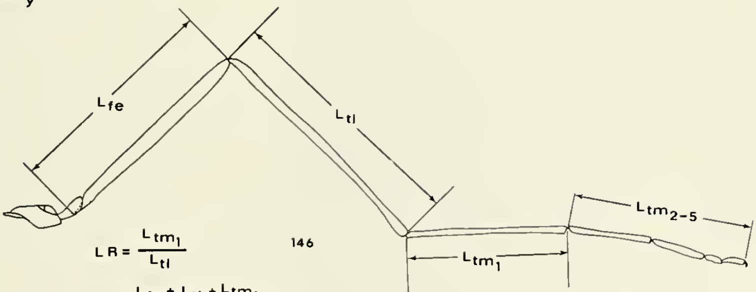


144

$VR = \frac{x}{y}$



145

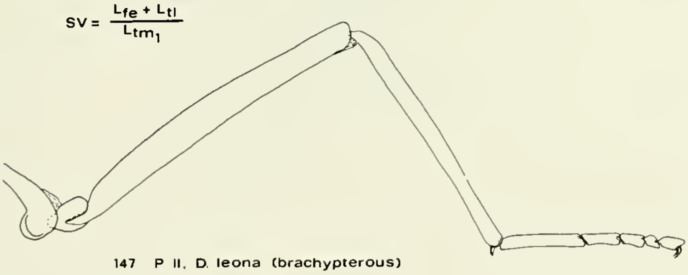


146

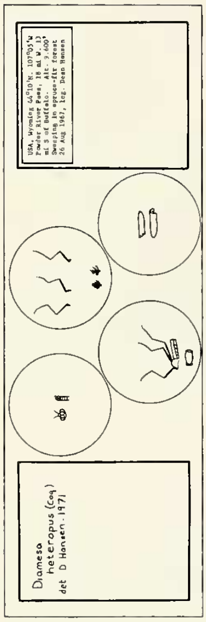
$LR = \frac{L_{tm_1}}{L_{tl}}$

$BV = \frac{L_{fe} + L_{tl} + L_{tm_1}}{L_{tm_{2-5}}}$

$SV = \frac{L_{fe} + L_{tl}}{L_{tm_1}}$



147 P II, D. leona (brachypterous)



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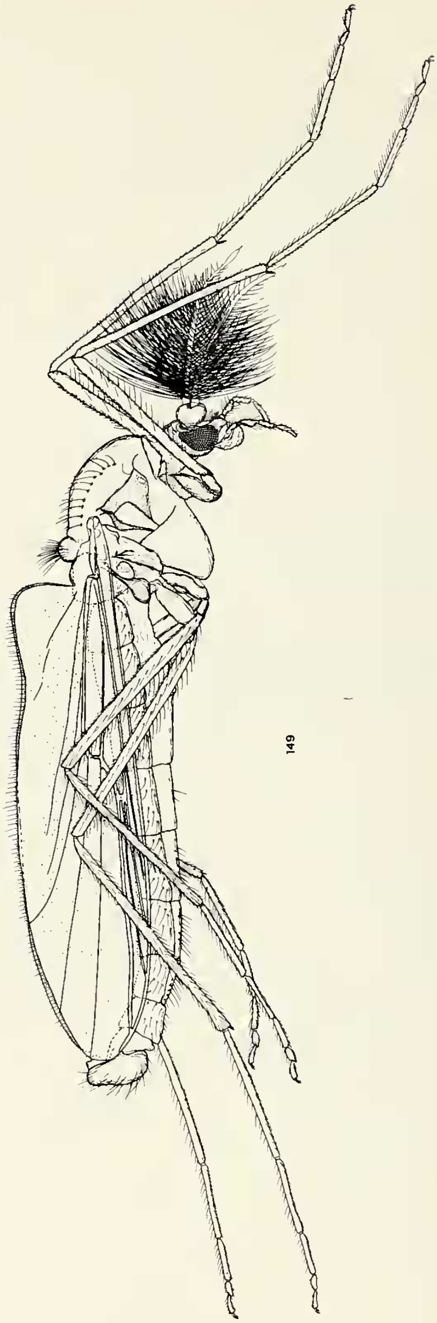

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FIGS. 148-149.—Fig. 148. Slide mount showing arrangement of parts of adult and label. The antennae should perhaps be mounted with the wings. This would make certain that the antennae could be observed with oil immersion. Fig. 149. Side view of *D. mendotae.*

Index

New species in **boldface,** synonyms in *italics.*